Lake Mead National Recreation Area

Las Vegas Wash Stabilization Project
Environmental Assessment

Lake Mead National Recreation Area **July 2001**
Clark County, Nevada

NATIONAL
PARK
SERVICE
Department
of the Interior

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SUMMARY

INTRODUCTION

The National Park Service (NPS) is considering placing three grade-control structures at intervals downstream of the Northshore Road Bridge, within Las Vegas Wash, at Lake Mead National Recreation Area (NRA) to protect the Northshore Bridge from erosion. The Lake Mead NRA is in southeastern Nevada and northwestern Arizona and encompasses lands around Lake Mead and Lake Mohave. Since construction of Northshore Road Bridge in 1978, the ever-increasing amount of runoff in Las Vegas Wash has caused the wash channel to cut ever deeper into the landscape and has caused the wash channel to grow wider, threatening the stability of the bridge. Without the NPS taking action, the bridge could eventually fail.

The environmental assessment (EA) analyzes the no action alternative and an alternative to construct stabilization measures within Las Vegas Wash, including three grade-control structures at intervals downstream from the Northshore Road Bridge. The NPS will decide which alternative to implement. The EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and regulations of the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1508.9).

PURPOSE OF AND NEED FOR THE PROJECT

The primary purpose of this project is to enhance safety for users of the Northshore Road Bridge by improving its stability and longevity while protecting natural and cultural resources. An additional purpose of the project is to reduce erosion in the Las Vegas Wash such that water quality is enhanced in the project area and downstream. The proposal is needed because the Northshore Road Bridge is designated by the Federal Highway Administration (FHWA) as scour critical and, as such, poses a threat to safety. "Scour critical" indicates that the pier foundations of the bridge are unstable for calculated scour conditions. The FHWA listed the bridge as scour critical after noticing during their inspection of the bridge and wash in 1999 that the channel had been down-cut (i.e., deepened) and widened (FHWA 1999). As the wash channel deepens and widens, the bridge could be undermined and could collapse into the wash (Ayres Associates 2001). Given that vehicles on this portion of Northshore Road routinely travel at approximately 80 kilometers (50 miles) per hour, such a catastrophic failure of the bridge could result in loss of human life.

ALTERNATIVES

The EA evaluates two alternatives: taking no action, or installing stabilization measures in Las Vegas Wash near Northshore Road Bridge. Seven other alternatives were considered but were not fully developed for various reasons.

Alternative A (No Action)

This alternative sets a baseline against which to compare impacts of action alternatives. Under the No Action Alternative, existing conditions and management actions at Las Vegas Wash in the vicinity of Northshore Road Bridge would continue into the future. No long-term stabilization measures would be implemented, and the Las Vegas Wash at the Northshore Road Bridge would continue to degrade. Specifically, the trend of the canyon floor degrading and widening would continue unchecked. Inclusion of a No Action Alternative is required by the CEQ regulations and serves as a benchmark against which proposed federal actions are evaluated.

Alternative B (Preferred)

This alternative would include three components: installing grade-control structures in Las Vegas Wash downstream of Northshore Road Bridge, stabilizing the canyon walls near the bridge, and stabilizing a tributary to the wash.

Three grade-control structures at intervals downstream of the Northshore Road Bridge would stabilize the wash channel at or near its present level and width. The grade-control structures would be constructed of roller-compacted concrete (RCC). RCC would be composed of material excavated on-site, so it would visually blend in with the wash and vicinity.

Stabilization of the north and south canyon walls of Las Vegas Wash just upstream of the bridge would include placing the RCC riprap in a stepped pattern, horizontally into the wash and slightly vertically up the side of the canyon wall. Such stabilization, termed “toe protection,” would protect the stream banks and canyon walls from further erosion and undercutting just upstream of the Northshore Road Bridge.

Stabilization of the tributary that enters Las Vegas Wash on the south bank just downstream of the Northshore Road Bridge would protect the south end of the bridge from erosion. A stepped RCC chute would be constructed to stabilize the tributary.

The construction access route for haul trucks during the stabilization effort in 1997 would be used once again as the access route for construction equipment associated with Alternative B. The route is approximately 0.8-kilometer (0.5-mile) long and is in the wash located directly north of and parallel to Las Vegas Wash. The access route is approximately 2.4 meters (8.0 feet) wide, although a portion of the route within Las Vegas Wash has been washed out and no longer exists.

If Alternative B is selected for implementation, the Federal Lands Highway Program would fund construction. Construction would commence in November 2001 and is anticipated to take approximately four months.

Environmentally Preferred Alternative

Alternative B has been identified as the environmentally preferable alternative because overall it would best meet the requirements of Section 101 of NEPA. It would help stabilize Las Vegas Wash, thereby reducing erosion, improving water quality, and preserving the integrity of Northshore Road Bridge. Implementation of Alternative B also would allow for mitigation measures, such as planting new emergent and riparian vegetation and removing nonnative tamarisk (saltcedar) (*Tamarix ramosissima*), which would improve overall project area vegetation in the long term.

MITIGATION AND MONITORING MEASURES

Mitigation measures are specific actions designed to minimize, reduce, or eliminate impacts of alternatives and to protect NRA resources and visitors. Monitoring activities are actions to be implemented during or following construction. Unless otherwise noted, the following measures will be implemented under Alternative B. These measures are assumed in the analysis of environmental consequences for the applicable alternative.

Safety

Bridge Safety: If the No Action Alternative is selected, or if Alternative B is selected and construction is delayed beyond 2001, then safety measures will be developed and implemented in the short term (i.e., until long-term stabilization measures are implemented). Flows in this reach of Las Vegas Wash are regulated by the Lake Las Vegas dam upstream, which is controlled by Lake Las Vegas Resort. The Clark County Regional Flood Control District (Flood Control District) has a flood warning system for monitoring floods in Las Vegas Wash. A warning protocol would be developed among the Flood Control District, the dam operators at Lake Las Vegas Resort, and the NPS to prevent use of the bridge should it become unsafe. For instance, a protocol could be instituted whereby the bridge would be closed whenever Lake Las Vegas dam is expecting to release flows from the auxiliary spillway. Such a protocol would require the Lake Las Vegas dam operators to notify the NPS and for NPS personnel to be trained on bridge closure procedure. Swing gates and road closure signs at the north and south ends of the Northshore Road Bridge would be required to implement a closure.

The warning and closure approach would be augmented by monitoring and frequent inspection of the bridge. Monitoring would include float-out devices at critical points along the base of the canyon walls and tilt meters on the bridge structure. These devices, combined with training and a well-developed warning protocol, would protect against injury and loss of life should the bridge become unsafe or if it were to collapse before long-term stabilization solutions were implemented.

Visitor Safety: During construction, NRA visitors will be routed away from construction areas, including the construction access route. Barricades will be placed around construction areas to prevent visitor entry, and entry to the Wetlands Trail will be blocked. If necessary, Northshore Road will be closed temporarily, for periods of no longer than 30 minutes, and appropriate signs will be posted notifying visitors of its closure. Only construction and haul vehicles will be allowed to use the construction access route, except during emergencies.

Natural Resources

Geology, Topography, and Soils: A qualified geologist will assess the toe protection project area near the bridge before construction begins to determine if toe protection measures would result in canyon wall failure.

Water Resources: Best management practices (BMPs) are means of preventing or reducing nonpoint source pollution in the Las Vegas Wash watershed and of minimizing soil loss and sedimentation. BMPs will minimized impacts to Las Vegas Wash and will include all or some of the following features, depending on site-specific requirements:

- Locating waste and excess excavation outside the riparian area to avoid sedimentation;

- Prior to construction, installing silt fences, straw bale barriers, temporary earthen berms, temporary water bars, sediment traps, stone check dams, brush barriers, or other equivalent measures, including installing erosion-control

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Wetlands: The Las Vegas Wash Wetland Enhancement Project will be adopted. The goals and objectives of this project are to actively introduce desired native wetland and riparian plants that are capable of sustaining a viable wetland community that promotes a high degree of plant diversity and associated wildlife habitat.

The desirable plant species to be planted on approximately 4 hectares (10 acres) include emergent species such as spikerush (*Eleocharis* spp.), bulrush (*Scripus* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), and riparian plants such as willow (*Salix exigua*, *gooddingii*), cottonwood (*Populus fremontii*), and mesquite (*Prosopis pubescens* and *Prosopis glandulosa*).

Only native plants will be used. Emergent species may be collected from harvesting local sources including Lake Mead, Lake Mohave, and various springs and surrounding areas. Plant material may be propagated at the nurseries for Lake Mead and the Nevada Department of Conservation and Natural Resources, Division of Forestry. Emergent plants may be directly transplanted into the project area immediately following harvest or may be held and further propagated at the Lake Mead nursery.

Planting techniques include rhizomes or tubers, seedlings, rooted containers, root/rhizome/plant clumps, and seeds. Plant collection will occur in the late fall or winter. Transplanting will occur preferably in the winter during plant dormancy. Labor will be performed by Lake Mead staff, seasonal work crews, and volunteers.

Specific transplant locations will be determined after the water levels at the structures have reached a consistent and desirable elevation. Emergent species will be planted in water less than 0.6-meter (2 feet) deep, and riparian species will be planted along the shoreline within or near the zone of soil saturation. Densities will vary depending on the species and allowable transplant habitat. In general, transplanting will occur in light densities since most plant species used reproduce by rhizomes and root suckering and are capable of rapid colonizations.

Photo-point monitoring has been established in the wash. Photo points will document revegetation efforts, and the transplanted plants will be monitored for survival rates. A water level monitoring system will be established to document surface elevations.

Vegetation: Undesirable species, such as tamarisk, will be aggressively controlled in high-priority areas. Other undesirable species will be monitored, and control strategies will be initiated if these species occur.

Riparian vegetation will be avoided, as feasible. To prevent the introduction of and to minimize the spread of exotic vegetation and noxious weeds, the following measures will be implemented:

- Minimize soil disturbance;
- Pressure-wash all construction equipment before it is brought into the NRA;
- Limit vehicle parking to existing roads, parking lots, or the access route;

- Obtain all fill, rock, or additional topsoil from the project area;

- Revegetate all disturbed areas immediately following construction activities with adapted native seed or plants that are found in adjacent areas and that are certified as weed free; and

- Monitor all disturbed areas for two to three years following construction to identify noxious weeds or exotic vegetation. Remedial and control measures will be implemented as needed and could include mechanical, biological, chemical, or additional revegetation treatments, in accordance with NPS-13, Integrated Pest Management Guidelines.

To maximize restoration efforts after completion of construction activities, the following measures will be implemented:

- Salvage topsoil from access route construction for reuse during restoration on disturbed areas to ensure proper revegetation;

- Salvage native vegetation for subsequent replanting in the disturbed area; and

- Monitor revegetation success for three years following construction; implement remedial and control measures as needed.

Herbicide application to control vegetation will be restricted to chemicals that do not pollute or persist in wetland, riparian, and aquatic areas. Potential drift and runoff from chemical application will be considered, as will appropriate methods and timing of application.

Special Status Species: Although there are no threatened, endangered, or other special status species known to occur in the project area, species evaluations of the project area will be performed as specified below. In addition, informal consultation with US Fish and Wildlife Service (USFWS) will be conducted to finalize the determination of no effect, or not likely to adversely affect, threatened or endangered species.

To avoid impacts to desert tortoise (*Gopherus agassizii*), construction will not commence until November 2001, after desert tortoise active fall season. Upland areas of the project area will be resurveyed for desert tortoise and burrows just before construction begins in any given area. The intent of these surveys is to remove all tortoises on the project site and to identify burrows that could be avoided during construction. Additional desert tortoise mitigation and monitoring measures that will be followed are outlined in Appendix A.

The measures described below summarize mitigation and monitoring to avoid impacts to the southwestern willow flycatcher (*Empidonax traillii extimus*). The southwestern willow flycatcher typically arrives in the region in late April. If construction is not completed by that time, a qualified biologist will survey the project area for the southwestern willow flycatcher. If this species is detected in the project area, construction will be suspended, and the NPS will contact USFWS to jointly develop a plan to avoid impacts. Any other migratory bird nests discovered during this process will be flagged and avoided.

Air Quality: During construction, water will be applied as necessary to minimize the release of dust. Low-sulfur fuel (0.05 percent by weight) will be used for diesel equipment. Gasoline-powered equipment will be used when available, and construction equipment will be properly tuned.

Cultural Resources

If undiscovered cultural resources are encountered during construction activities, activities in the immediate area will be stopped. The NPS will consult the appropriate parties according to 36 CFR 800.13 and, as appropriate, portions of the Native American Graves Protections and Repatriation Act of 1990.

Visual Resources

Stabilization features will be designed to match the color of the natural substrate in the project area as closely as feasible.

Visitor Use and Experience

Any necessary closures of Northshore Road to conduct construction under Alternative B will be temporary and will occur on weekdays, if practicable. The NPS will post additional signs in the area with recommendations that body contact with wash water be avoided.

AFFECTED ENVIRONMENT

The affected environment of the project area includes public safety, geology, topography, soil resources, water resources (including floodplains and wetlands), vegetation, wildlife and aquatic life, special status species, air quality, noise, cultural resources, visual resources, and visitor use and experience.

ENVIRONMENTAL CONSEQUENCES

Environmental consequences are the likely beneficial and adverse effects to the environment that would result from implementing the alternatives under consideration. Consequences include short-term and long-term effects, direct and indirect effects, cumulative effects, and the potential for each alternative to impair park resources. For any identified impacts, a determination has been made as to whether it would constitute a significant impact. In addition, potential benefits of implementing an alternative are identified.

Terms referring to impact intensity, context, and duration are used in the effects analysis. Unless otherwise stated, the standard definitions for these terms are as follows:

§ *Negligible*: The impact is at the lower level of detection; there would be no measurable change.

§ *Minor*: The impact is slight but detectable; there would be a small change.

- *Moderate*: The impact is readily apparent; there would be a measurable change that could result in a small but permanent change.

- *Major*: The impact is severe; there would be a highly noticeable, permanent measurable change.

- *Localized Impact*: The impact occurs in a specific site or area. When comparing changes to existing conditions, the impacts are detectable only in the localized area.

- *Short-Term Effect*: The effect occurs only during or immediately after implementation of the alternative.

- *Long-Term Effect*: The effect could occur for an extended period after implementation of the alternative. The effect could last several years or more and could be beneficial or adverse.

Significance thresholds are provided in Section 4. The following text briefly summarizes the environmental consequences associated with each resource from the No Action Alternative and Alternative B.

Public Safety

If the Northshore Road Bridge were to collapse because no action was taken, then the No Action Alternative would result in major adverse, long-term, localized impacts to safety. These impacts would be significant if the bridge were to collapse while people were using it. Implementing Alternative B would result in major beneficial, long-term, localized effects to safety since it would substantially reduce the potential of bridge collapse.

Geology, Topography, and Soils

Neither alternative would result in changes to geologic processes or significant impacts to geology, topography, or soils. The No Action Alternative would result in moderate adverse, long-term, localized impacts to geology, topography, and soils because continued erosion would further degrade and widen the wash bottom, and wall slumping/toppling would be possible.

Excavation necessary for Alternative B would result in minor adverse, long-term, localized impacts to soils as a result of constructing grade-control structures in the wash. These adverse impacts would be outweighed by the major beneficial, long-term, localized effects to soils and topography that would occur because the streambed and banks would be stabilized. The net result would be moderate beneficial, long-term, localized effects.

Water Resources

Under the No Action Alternative, both the base flows and flood flows would cause continued and increased erosion of the wash channel, both in and upstream of the project area, which would result in increased in-stream sediment and turbidity levels in the wash, and in Las Vegas Bay of Lake Mead. As such, this alternative would result in minor and potentially moderate adverse, long-term, impacts to water resources in the project area and downstream (i.e., Las Vegas Bay). Overall, no significant impacts to water resources are anticipated under the No Action Alternative. However, inconsistencies with EO 11988 (Floodplain Management) are possible if the wash floodplain continues to degrade. Continued degradation could also drain project area fringe wetlands (because of further channel deepening).

During construction of Alternative B, there would be minor short-term increases of in-stream sediment and turbidity levels immediately downstream of grade-control structure locations. In the long term, however, the grade-control structures would slow wash water, thus decreasing soil erosion and the amount of sediment flowing into Lake Mead. Implementing Alternative B would result in moderate beneficial, long-term, effects to water quality and floodplains in the project area and downstream. Fringe wetlands would also be temporarily impacted by construction equipment. Alternative B would also result in minor adverse, long-term impacts to fringe wetlands. However, wetlands mitigation would offset these impacts, and the net result of Alternative B would be moderate beneficial, long-term effects to wetlands.

Vegetation

The No Action Alternative would not affect project area vegetation. However, if the bridge were to fail and collapse, there would be moderate adverse, short-term (and possibly long-term), localized impacts to vegetation.

Implementing Alternative B would result in minor beneficial, long-term, effects to vegetation. It would require removing riparian vegetation, primarily nonnative tamarisk, to access the wash. In-stream construction would affect approximately 3.0 hectares (7.4 acres) of tamarisk, cattail (*Typha domingensis*), and salt grass (*Distichlis spicata*) during construction. Removing tamarisk would be beneficial to the project area vegetation. Long-term impacts to in-stream vegetation would be considerably less than the above short-term impacts and would occur where actual structures and toe protection would be located. The total area required for installing structures under Alternative B is approximately 0.7 hectare (1.7 acres). Since approximately one-third of this area is estimated to contain vegetation, approximately 0.2 hectare (0.4 acre) of vegetation would be permanently removed. Primarily tamarisk, cattail, and salt grass would be affected.

Wildlife and Aquatic Life

Neither alternative would result in significant adverse impacts to wildlife or aquatic life. Implementing the No Action Alternative would result in minor adverse, long-term impacts to aquatic life. It could also result in moderate to major adverse impacts to wildlife and aquatic life if the bridge were to fail. Implementing Alternative B would result in minor adverse, short-term impacts to wildlife and aquatic life because of construction-related disturbances. Minor—and potentially moderate—beneficial long-term effects to wildlife and aquatic life would be realized because revegetating riparian areas with native species, as well as removing some nonnative tamarisk, would increase plant structure and diversity. This would increase the project area's relative value to wildlife.

Special Status Species

Neither alternative would result in significant adverse impacts to special status species. Implementing the No Action Alternative would result in negligible adverse, long-term impacts to the razorback sucker (*Xyrauchen texanus*) because of decreased water quality in Las Vegas Bay of Lake Mead. As the wash continues to degrade, the overall loss of wetlands associated with the entire wash could result in less available habitat for species such as the willow flycatcher and the Yuma clapper rail *(Rallus longirostris yumanensis)*. There would be no impacts to special status species under Alternative B.

Air Quality

Alternatives A and B would not impact air quality.

Noise

Implementing the No Action Alternative would not impact noise. Alternative B would result in moderate adverse, short-term impacts to project area noise during construction activities.

Cultural Resources

Neither alternative would affect cultural resources.

Visual Resources

Neither alternative is anticipated to result in significant adverse impacts to visual resources. Implementing the No Action Alternative would not affect visual resources. However, if the bridge were to fail and collapse, there would be moderate to major short-term (and possibly long-term) adverse, localized impacts.

Implementing Alternative B would have moderate adverse, short-term, localized impacts on visual resources in the project area during construction activities. Minor long-term benefits to visual resources could occur as a result of slowing wash flows and making the wash appear more like a wetland environment than a fast-flowing stream.

Visitor Use and Experience

Neither alternative would result in significant adverse impacts to visitor use and experience. Under the No Action Alternative, further deepening the wash channel would result in fewer access points to the wash because of its steep and unstable terrain. Altering the wash channel also could make the Wetlands Trail impassable. Either situation would result in closing the Wetlands Trail. Opportunities for viewing wildlife and plant species in the vicinity of the trail also would be lost if the trail were closed. Therefore, implementing the No Action Alternative would result in minor adverse, long-term, localized impacts to visitor use and experience.

Under Alternative B, temporary road closures necessary for construction activities would prevent visitors from accessing facilities on either side of the wash during construction, which would be moderate adverse, short-term, localized impacts. Implementing grade-control structures under Alternative B would maintain the long-term integrity and function of the Northshore Road Bridge, thus maintaining visitors' access across Las Vegas Wash. Slowing wash channel deepening and widening would maintain access points to the wash and the Wetlands Trail. Preserving access to and use of the Wetlands Trail would allow visitors continued recreational and educational opportunities associated with wildlife- and plant-viewing opportunities. Slowing wash flows could invite swimming, so the NPS would post additional signs in the area with recommendations that body contact with wash water be avoided. Overall, Alternative B would result in moderate beneficial, long-term effects to visitor use and experience.

CONSULTATION AND COORDINATION

The NPS solicited public comment on the EA through notices in local newspapers, the Lake Mead NRA Internet website, and by direct distribution to interested parties. Representatives from federal and state resource management agencies and Native American tribes were invited to review the EA.

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LIST OF ACRONYMS

Acronym	Full Phrase
ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effect
BMPs	Best Management Practices
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
EA	Environmental Assessment
EO	Executive Order
EPA	United States Environmental Protection Agency
FHWA	Federal Highway Administration
Flood Control District	Clark County Regional Flood Control District
LCRMSCP	Lower Colorado River Multispecies Conservation Program
LVWCC	Las Vegas Wash Coordination Committee
LVWPCT	Las Vegas Wash Project Coordination Team
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	United States Department of the Interior, National Park Service
NRA	National Recreation Area
NRHP	National Register of Historic Places
NVNHP	Nevada Natural Heritage Program
PM_{10}	Particulate Matter Smaller Than 10 Microns in Diameter
RCC	Roller-compacted Concrete
Reclamation	United States Bureau of Reclamation
SHPO	State Historic Preservation Office
SOF	Statement of Findings
US	United States
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

SECTION 1
PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

The National Park Service (NPS) is considering placing three grade-control structures at intervals downstream of the Northshore Road Bridge, within Las Vegas Wash, at Lake Mead National Recreation Area (NRA) to protect the Northshore Bridge from erosion. The Lake Mead NRA is in southeastern Nevada and northwestern Arizona and encompasses lands around Lake Mead and Lake Mohave (Figure 1-1). As described in Section 1.3, Background, since construction of Northshore Road Bridge in 1978, the ever-increasing amount of runoff in Las Vegas Wash has caused the wash channel to cut ever deeper into the landscape and has caused the wash channel to grow wider, threatening the stability of the bridge. Without the NPS taking action, the bridge could eventually fail.

This section describes the purpose of and need for the action and provides an overview of the project area and bridge conditions.

The environmental assessment (EA) analyzes the no action alternative and an alternative to construct stabilization measures within Las Vegas Wash, including three grade-control structures at intervals downstream from the Northshore Road Bridge. This document also includes discussions of alternatives that have been ruled out and justifications for their elimination.

1.2 PURPOSE AND NEED

The primary purpose of this project is to enhance safety for users of the Northshore Road Bridge by improving its stability and longevity while protecting natural and cultural resources. An additional purpose of the project is to reduce erosion in the Las Vegas Wash such that water quality is enhanced in the project area and downstream. The proposal is needed because the Northshore Road Bridge is designated by the Federal Highway Administration (FHWA) as scour critical and, as such, poses a threat to safety. "Scour critical" indicates that the pier foundations are unstable for calculated scour conditions. The FHWA listed the bridge as scour critical after noticing during their inspection of the bridge and wash in 1999 that the channel had been down-cut (i.e., deepened) and widened (FHWA 1999). As the wash channel deepens and widens, the bridge could be undermined and could collapse into the wash (Ayres Associates 2001). Given that vehicles on this portion of Northshore Road routinely travel at approximately 80 kilometers (50 miles) per hour, such a catastrophic failure of the bridge could result in loss of human life. The FHWA findings are further discussed in Section 1.4, along with a summary of a hydrological analysis of the wash at the bridge and an overview of previous erosion stabilization attempts.

1.3 BACKGROUND

1.3.1 Project Area Location

Las Vegas Wash is in southeastern Las Vegas Valley and is approximately 19 kilometers (12 miles) long, from its headwaters northwest of the Las Vegas metropolitan area to its mouth at Las Vegas Bay, an arm of the western portion of Lake Mead. About 0.6 kilometer (0.4 mile) upstream of the bridge is Lake Las Vegas, which is discussed in Section 1.3.2. Figures 1-2 and 1-3 depict the project area. Las Vegas Valley has a total drainage area of about 5,700 square kilometers (2,200 square miles) and includes the metropolitan area of Las Vegas. It is the primary drainage channel for all stormwater, urban runoff, shallow groundwater, and treated wastewater discharges in the entire valley. The drainage area has extensive vertical relief. The maximum elevation is nearly
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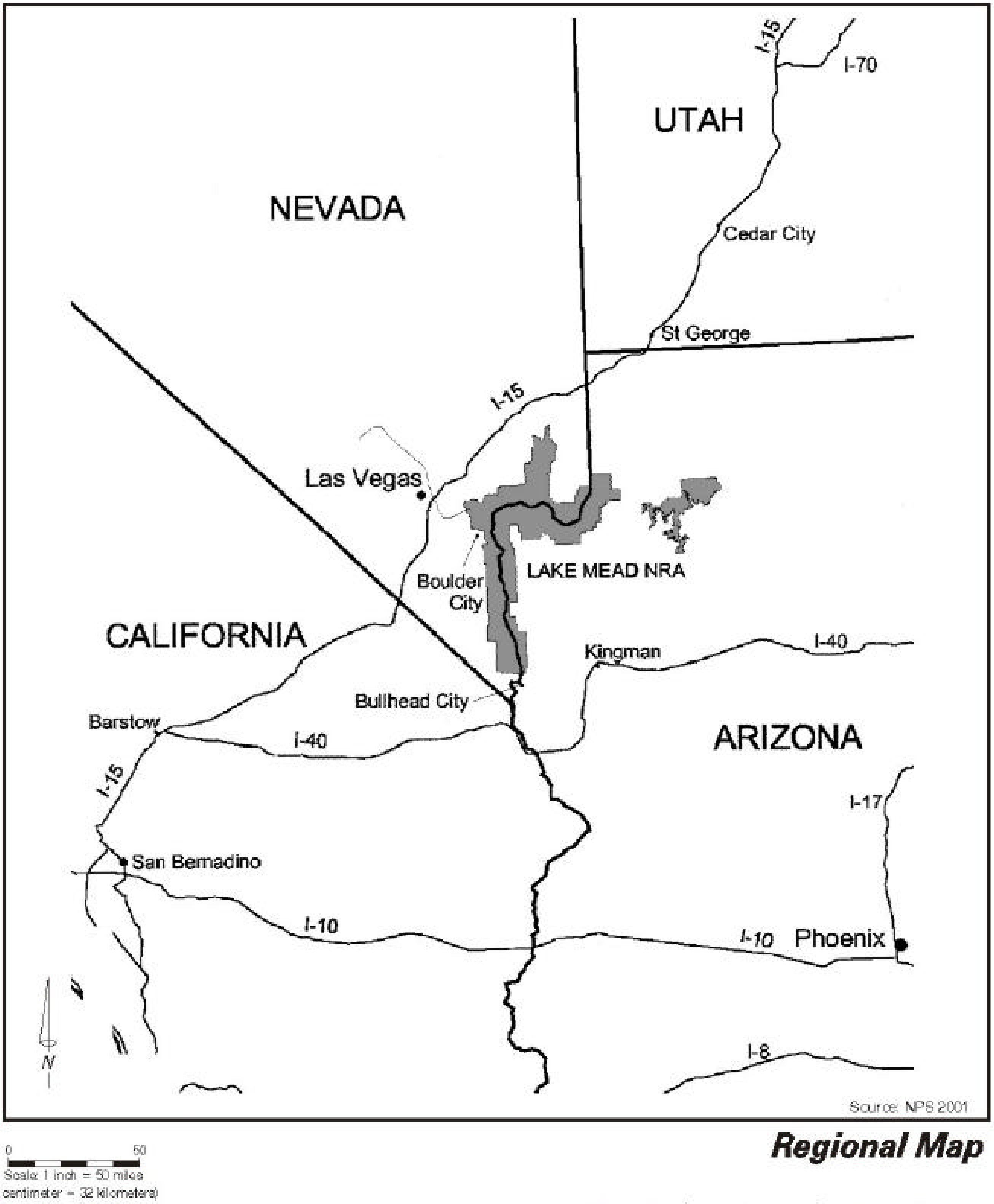

Regional Map

Lake Mead National Recreation Area, Nevada

Tetra Tech, Inc.

Figure 1-1

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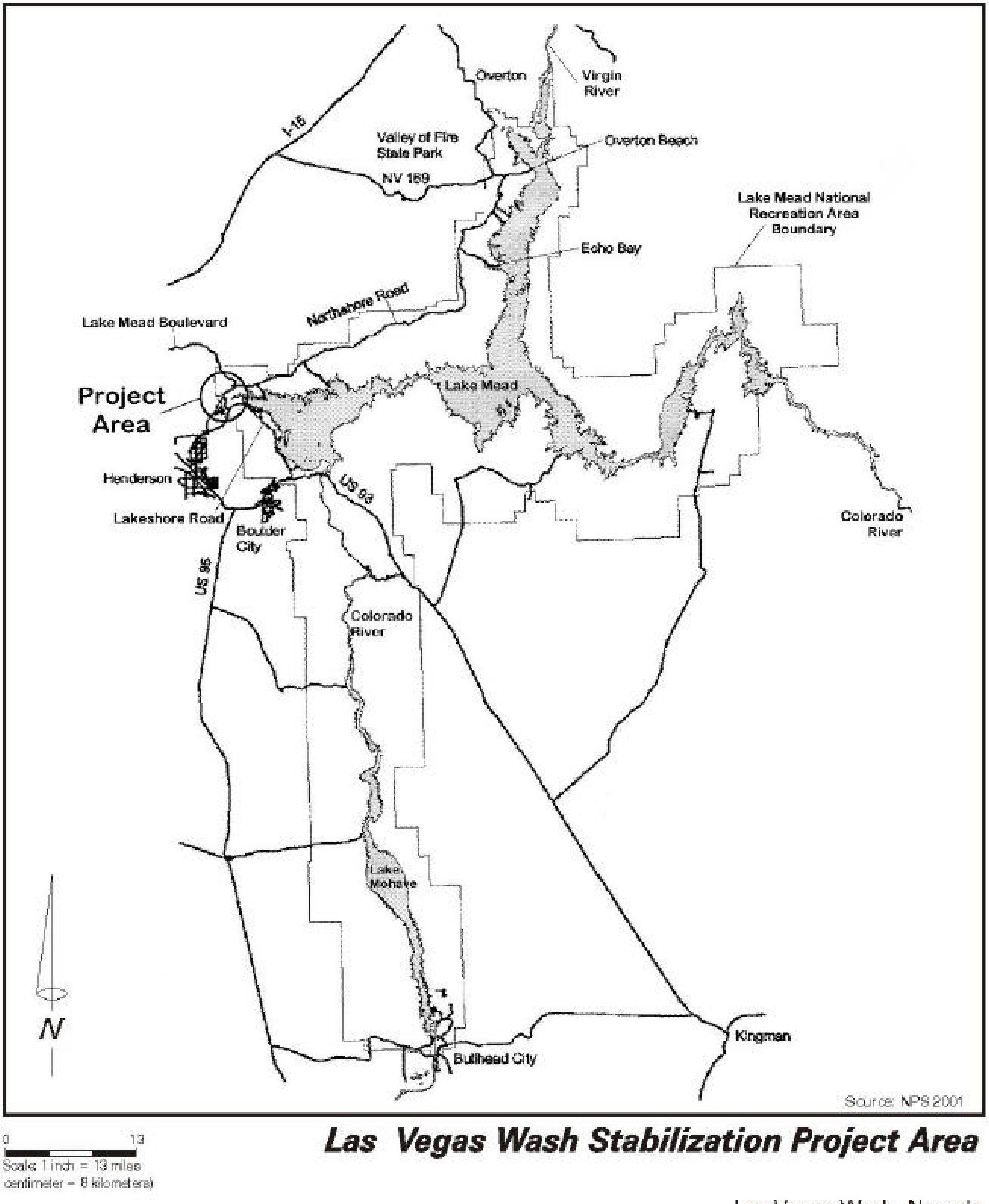

Las Vegas Wash Stabilization Project Area

Las Vegas Wash, Nevada

Tetra Tech, Inc.

Figure 1-2

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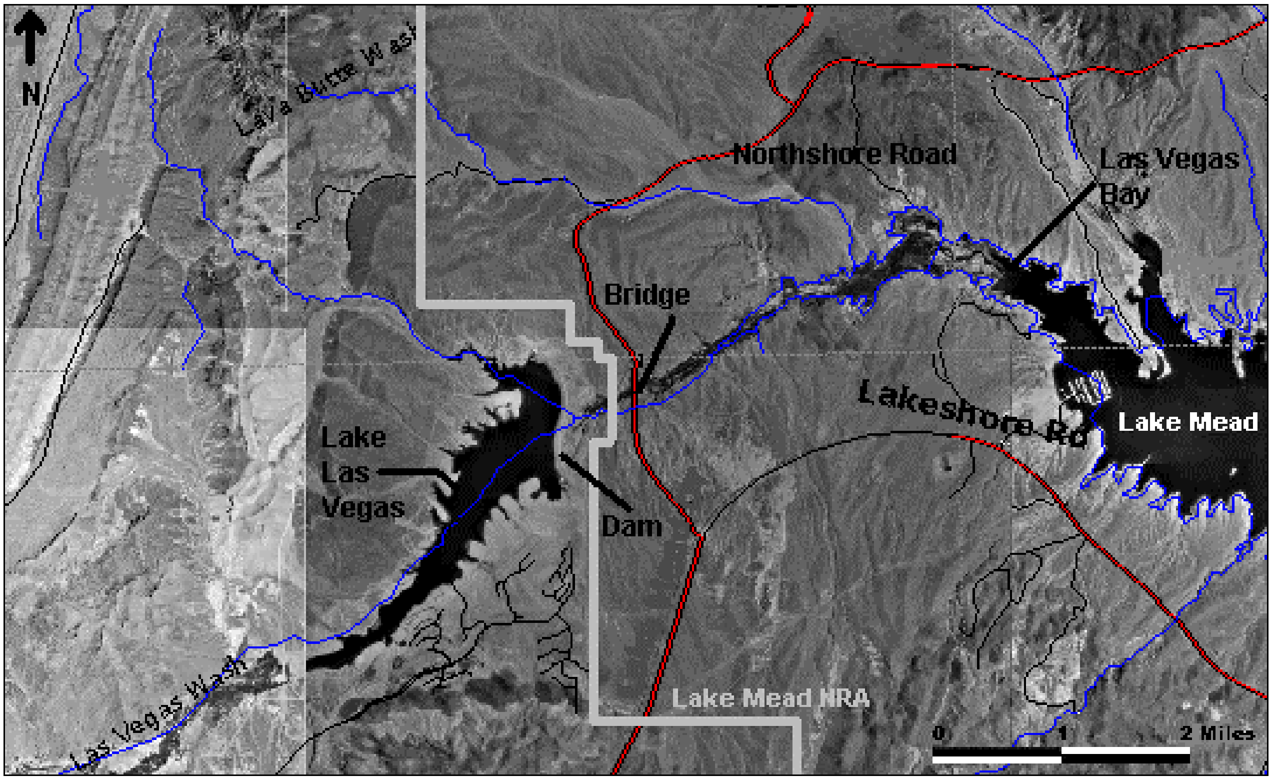


Figure 1-3 Aerial Photograph of Las Vegas Wash Stabilization Project Area
Note that normal flows in Las Vegas Wash bypass Lake Las Vegas through pipes underneath the lake; however, flood flows that exceed the capacity of the pipes do enter the lake.

1.3.2 History of Las Vegas Wash

Before the urbanization of the Las Vegas Valley, Las Vegas Wash was an ephemeral stream, flowing only during significant rainfall events. Rapid population growth in the valley began in the 1930s with the construction of Hoover Dam, continued into the 1940s with wartime military activity, and has continued to the present day because of growth in the gaming and entertainment industries. Urban development has been accompanied by an increase in treated wastewater discharges and increased urban runoff into the wash. By 1955, Las Vegas Wash had become a perennial stream, and, as such, it flows year-round (Glancy 1999). Today, the average base flow due to treated wastewater discharge is about 6.8 cubic meters per second (240.1 cubic feet per second) (LVWPCT 2000).

The project area reach of Las Vegas Wash has been unstable since the 1960s. By 1969, floodplain erosion was visible at two sites in the wash (Glancy 1999). The upstream erosion site was at its confluence with the Three-Kids Wash tributary. The downstream erosion site was on the downstream side of Northshore Road and is the subject of this EA. The Northshore Road crossing consisted of a box culvert in 1969. Increasing runoff and flood flows in Las Vegas Wash were undermining and eroding the outlet of the box culvert to the degree that it was in danger of completely washing out, collapsing, and closing the road. Therefore, in 1978, the culvert was removed and replaced by the existing bridge (Ayres Associates 2001).

The summer of 1984 produced multiple flash floods in Las Vegas Wash. These floods caused roughly 7.6 meters (24.9 feet) of floodplain degradation in the vicinity of the Northshore Road Bridge. From 1960 through 1984, an estimated 3.4 million cubic meters (120.1 million cubic feet) of sediment were eroded from the wash and deposited in Lake Mead (Ayres Associates 2001).

Construction of the Lake Las Vegas dam began in 1989 and was completed in the early 1990s (Figure 1-3). Water from Lake Mead was pumped to fill the area behind the dam to create Lake Las Vegas. Water in Las Vegas Wash bypasses Lake Las Vegas because it is channeled underneath the lake through buried concrete pipes; however, Las Vegas Wash flood flows that exceed the capacity of the bypass conduit do enter Lake Las Vegas. When necessary, the flood flows are released to the downstream reach of Las Vegas Wash through a combination of spillways. As such, wash flows in the reach of the wash east of Lake Las Vegas are regulated by the dam upstream.

Large floods occurred in Las Vegas Wash in July and September of 1998 and again in July 1999. The 1999 flood is the flood of record, with an estimated peak discharge rate of 481.4 cubic meters per second (17,000 cubic feet per second) just upstream of Lake

1.4.2 Hydrologic Analysis Results

The canyon walls of the Las Vegas Wash at the Northshore Road crossing are vertical or nearly vertical. At the base of the walls there is evidence of massive geotechnical failures, and tension cracks are visible at the tops of the walls on both sides of the wash, upstream and downstream of the bridge. As such, the canyon walls at the bridge appear to be geotechnically unstable (Ayres Associates 2001).

Threats to Abutments

The abutments (Figure 1-4) of each end of the bridge rest on shallow spread footings on the channel bank. As the wash channel deepens and widens, the abutments' shallow footings could be undermined and cause each of the two approach spans of the bridge to collapse into the wash. In 2000, the north abutment appeared to be threatened (Figure 1-4). The edge of the vertical canyon wall was approximately 10.7 meters (35.1 feet) from the abutment, and there were tension cracks at the top of the canyon wall near the upstream side of the bridge (Ayres Associates 2001).

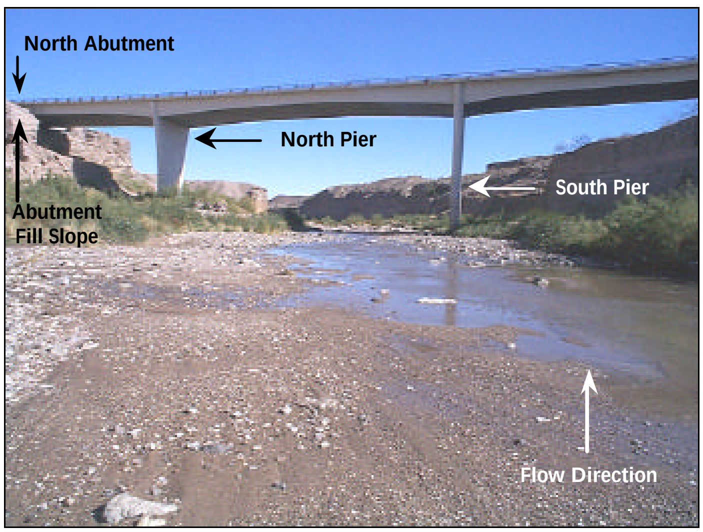


Figure 1-4
Northshore Road Bridge

View of Las Vegas Wash looking downstream (east), showing the bridge, the wash channel, and the high vertical canyon walls.

The south abutment (Figure 1-4) currently has more support, as there is a total of about 30 meters (98 feet) horizontally between the edge of the vertical canyon wall and the abutment. As shown in Figure 1-5, directly beneath the bridge deck there is a well-developed tension crack 1.2 meters (3.9 feet) from the top edge of the canyon wall. There are about 4.2 meters (13.8 feet) horizontally between the edge of the canyon and the base of the abutment fill slope. The extreme height of the near-vertical faces of the canyon walls suggests that geotechnical slope failures could destabilize the ground, well back from the tops of the walls. Based on field observation, it appears both abutments are at risk of being undermined by geotechnical failures of the canyon walls (Ayres Associates 2001).

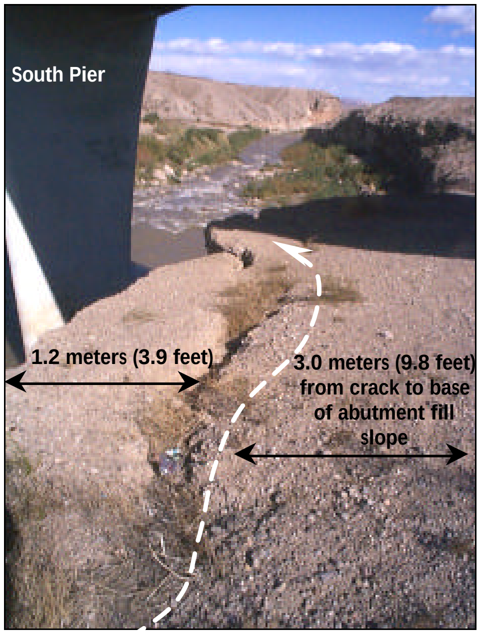


Figure 1-5
Tension Crack on Canyon Wall

View looking downstream (east) on the south canyon wall under the Northshore Road Bridge. The dashed line shows a large tension crack that has developed in the top of the 9-meter- (30-foot-) high canyon wall at the base of the south abutment fill slope, which is not visible but is to the right of the photo. The edge of the canyon wall is approximately 30 meters (98 feet) horizontally from the abutment. The material on the wash side of the tension crack will, in time, collapse into the wash.

Another threat to the abutments is local drainage outfalls. At the downstream edge of the north abutment, a culvert drains rainfall runoff from the surface of Northshore Road to the top edge of the wash canyon. The culvert outfall is perched almost at the edge of the vertical canyon wall, and there is evidence of scour at the outlet that could add to the risk of foundation stability problems at the north abutment. On the downstream side of the south abutment, a similar culvert drains rainfall runoff from the road to the base of the embankment near the south abutment. Local drainage outlets are contributing to erosion near both abutments and increase the risk to the abutments (Ayres Associates 2001).

On the south bank, just downstream of and parallel to the road, there is a small tributary that has incised very close to the base of the road embankment. As it drops into Las Vegas Wash the tributary passes very close to the downstream base of the south abutment. Tension cracks have formed at the top edge of the tributary wall, and from these cracks it appears the edge of the tributary canyon is slowly migrating closer to the south abutment (Ayres Associates 2001).

Threat to Piers

The two bridge piers (Figure 1-4) in the wash channel have foundations that sit on pilings driven deep into the channel bottom. The piers are susceptible to local scour and channel degradation. Whereas degradation removes soil from the entire channel and floodplain, local scour removes material in the vicinity of each pier. The north pier was founded on a horizon of conglomerate rock, which may or may not be resistant to scour and degradation. At the south pier no conglomerate layer was found. If the conglomerate layer is resistant to erosion, then the north pier may be at less risk of scour and degradation than the south pier (Ayres Associates 2001).

1.4.3 Previous Attempts at Stabilization

In 1996 and 1997, the NPS and the US Bureau of Reclamation (Reclamation) cooperatively constructed two detention structures or check dams in the wash channel immediately downstream of the Northshore Road Bridge. The check dams were constructed of riprap boulders and were intended to slow the flow of the wash and create shallow pond areas behind each dam. This would foster the growth of riparian vegetation, which would in turn further stabilize the channel. However, the check dams were not constructed of large enough rock to withstand the high velocity flows in the wash, and the structures were washed downstream shortly after their installation.

1.5 ENVIRONMENTAL ASSESSMENT

This EA analyzes the proposal and alternatives and their impacts on the environment. It outlines project alternatives (Section 2), describes existing conditions in the project area (Section 3), and analyzes the effects of each project alternative on the environment (Section 4). This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and regulations of the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1508.9).

1.6 RELATIONSHIP TO OTHER PLANNING PROJECTS

Lake Mead NRA management direction is found in the *Lake Mead NRA General Management Plan* (NPS 1986) and the *Lake Mead NRA Resource Management Plan* (NPS 2000). Other projects underway in Las Vegas Wash or outside the wash but in the project area are described below and include those that are completed, underway, or planned.

Other Grade-Control Structures. According to the Las Vegas Wash Comprehensive Adaptive Management Plan, to control erosion and stabilize Las Vegas Wash, 22 grade-control structures are required (LVWCC 2001a). As of 2001, four such structures were constructed upstream of the project area and an additional five structures are in the planning phase (LVWCC 2001a).

Nature Preserve. A nature preserve inside the 1,133-hectare (2,800-acre) Clark County Wetlands Park in Las Vegas was completed and the first phase was opened to the public in spring 2001 (LVWCC 2001b).

Floating Wetlands in Lake Mead. In November 2000, Reclamation constructed a floating wetland in Las Vegas Bay of Lake Mead in Lake Mead NRA to help maintain desirable wetland vegetation for improving water quality, for providing additional wildlife habitat, and for increasing biodiversity in the NRA (LVWCC 2001c).

Las Vegas Wash Tree Planting Project. Hundreds of volunteers joined Clark County Parks and Recreation Department, Friends of the Desert Wetlands Park, and the Las Vegas Wash Coordination Committee to plant nearly 10,000 trees and shrubs in a 2.8-hectare (7.0-acre) area on six separate sites within Las Vegas Wash. The majority of trees planted were willow (*Salix* spp.), cottonwood (*Populus* spp.), and mesquite (*Prosopis* spp.) (LVWCC 2001d).

1.7 ISSUES AND IMPACT TOPICS

Issues are related to potential environmental effects of project alternatives and were identified by the project interdisciplinary team (Section 6). Once issues were identified, they were used to help formulate the alternatives and mitigation measures. Impact topics based on substantive issues, environmental statutes, regulations, and executive orders (EOs) were selected for detailed analysis. A summary of the impact topics and rationale for their inclusion or dismissal is given below.

1.7.1 Impact Topics Identified for further Analysis

The following relevant impact topics are analyzed in the EA. Whether each issue is related to taking action or to no action is specified.

Public Safety

Taking no action could result in the continued undermining and erosion of the Northshore Road Bridge to the degree that it completely washes out, collapses, and closes the road. Such collapse could threaten human safety and could result in the loss of human life if people are in the area when such a collapse occurs.

Natural Resources

Geology, Topography, and Soils. Taking no action and its associated continued erosion of soils from Las Vegas Wash and its banks could result in further alteration of local topography.

Construction-related earthmoving activities could affect geologic processes or features or alter local topography. Similarly, placing grade-control structures in the Las Vegas Wash channel could alter its topography over time. Heavy construction equipment could compact the soil in the Las Vegas Wash and in the wash proposed as the construction access route; this could be detrimental to soil resources.

Water Resources. No action and the associated continued erosion of the wash channel could result in high levels of sediment in the project area and downstream. Construction activities in the wash channel could temporarily increase sediment, thereby degrading water quality in the project area and downstream. Wetlands and floodplains could be affected by construction.

Vegetation. Construction activities could affect riparian vegetation. After construction, project area nonnative vegetation could spread, and new species of nonnative vegetation could invade the project area.

Wildlife and Aquatic Life. Wildlife could be disturbed or displaced during construction. Some wildlife species that are unable to move away from mobile construction equipment could die. Construction in the wash channel could degrade water quality and aquatic habitat, both in the project area and downstream.

Special Status Species. Threatened, endangered, or other special status species in or near the project area could be affected during construction.

Air Quality. Construction activities could create dust that compromises air quality. Dust could temporarily decrease visibility in the project area and bordering Lake Mead NRA locations.

Noise

Construction-related noise could disturb sensitive receptors in the project area.

Cultural Resources

Construction in the wash channel could degrade undiscovered cultural resources.

Visual Resources

Human-made structures in Las Vegas Wash could detract from its natural appearance.

Visitor Use and Experience

Construction activities and associated temporary road closures could prevent Lake Mead NRA users from accessing facilities in the NRA, particularly the Wetlands Trail.

1.7.2 Impact Topics Dismissed from Analysis

The following topics are not further addressed in this document because there are no potential effects to these resources, which are not in the project area:

- Designated ecologically significant or critical areas;
- Wild or scenic rivers;
- Designated coastal zones;
- Designated wilderness or proposed wilderness areas;
- Indian Trust resources;
- Prime and unique agricultural lands;
- Sites on the US Department of the Interior's National Registry of Natural Landmarks; or
- Sole or principal drinking water aquifers.

In addition, there are no potential conflicts between the project and land use plans, policies, or controls (including state, local, or Native American) for the project area.

There are no potential impacts to Lake Mead NRA operations because construction would not coincide with use of the Wetlands Trail for NRA environmental education programs and because future use of the trail for such programs is not planned.

Regarding energy requirements and conservation potential, construction activities would require the increased use of energy for the construction itself and for transporting materials. However, overall, the energy from petroleum products required to implement action alternatives would be insubstantial when viewed in light of production costs and the effect of the national and worldwide petroleum reserves.

There are no potential effects to local or regional employment, occupation, income changes, or tax base as a result of this project. The project area of effect is not populated and, per EO 12898 on Environmental Justice, there are no potential effects on minorities, Native Americans, women, or the civil liberties (associated with age, race, creed, color, national origin, or sex) of any American citizen. No disproportionate high or adverse effects to minority populations or low-income populations are expected to occur as result of implementing any alternative. Input from the Southern Paiute tribes with interest in the project area will be solicited.

SECTION 2
ALTERNATIVES

2.1 INTRODUCTION

This section describes the alternatives considered, including the No Action Alternative. The alternatives described include mitigation measures and monitoring activities proposed to minimize or avoid environmental impacts. This section also includes a description of alternatives considered early in the process but later eliminated from further study; reasons for their dismissal are provided. The section concludes with a comparison of the alternatives considered.

2.2 ALTERNATIVE A (NO ACTION)

Inclusion of a No Action Alternative is required by the CEQ regulations and sets a baseline against which to compare impacts of action alternatives. Under the No Action Alternative, existing conditions and management actions at Las Vegas Wash in the vicinity of Northshore Road Bridge would continue into the future. No long-term stabilization measures would be implemented, and the Las Vegas Wash at the Northshore Road Bridge would continue to degrade. Specifically, the trend of the canyon floor degrading and widening would continue unchecked.

2.3 ALTERNATIVE B (PREFERRED)

2.3.1 Las Vegas Wash Stabilization

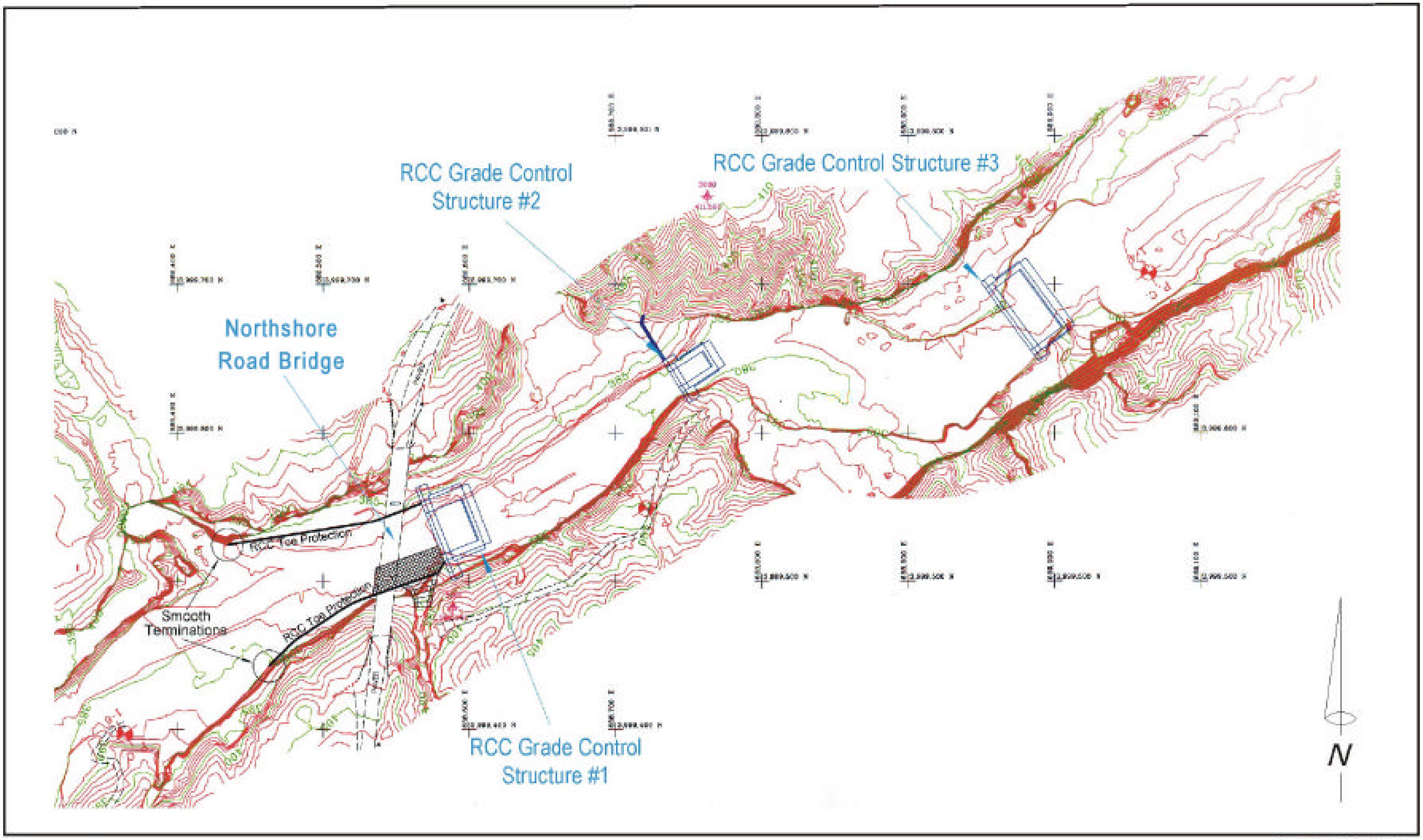
Alternative B, which the NPS prefers, would include installing three grade-control structures at intervals downstream of the Northshore Road Bridge to stabilize the wash channel at or near its present level and width. The grade-control structures would be constructed of roller-compacted concrete (RCC). RCC would be composed of material excavated on-site, so it would visually blend in with the wash and vicinity. No modifications to the bridge, its abutments, or its piers would be made. Figure 2-1 is a conceptual design of Alternative B.

The upstream-most structure would be immediately downstream of the bridge and would be approximately 1.2 to 1.5 meters (4.0 to 5.0 feet) higher than the existing bed of the wash. The second structure would be approximately 200 meters (656 feet) downstream from the first, and the third structure would be roughly 260 meters (853 feet) downstream of the second. All measurements between structures are along the channel thalweg, which is the line connecting the lowest or deepest points along the streambed. Each of the three structures would provide a vertical 2.5-meter (8.2-foot) drop (Ayres Associates 2001).

Because the upstream face of each RCC structure would be somewhat higher than the existing streambed, the upstream face would act as a temporary impoundment to water flowing downstream. This would slow the velocity of water flowing downstream, which in turn would reduce erosion and associated channel widening and deepening. The streambed immediately upstream of the upstream face would fill in with sediment over approximately one to two years. They would not be filled in mechanically following construction, but instead would be allowed to fill in naturally over time.

The second and third grade-control structures would have an RCC stilling basin on the downstream side to protect the structure from failure resulting from local scour at the downstream face. The first grade-control structure would be constructed either with or without a stilling basin on the downstream side, a determination that would be made during final design. The floor of each stilling basin would be 1.0 meter (3.3 feet) below the top of the downstream edge of the basin, which would be set at the future channel grade. Downstream of each stilling basin a short riprap apron would be installed to protect the structures from scouring and undercutting (Ayres Associates 2001). Figure 2-2 depicts a profile of the upstream-most grade-control structure with optional stilling basin. The profiles of the second and third grade-control structures would be similar to Figure 2-2, with the exception of elevations and exact dimensions of the structures.

Without the installation of grade-control structures under Alternative B, the ultimate depth of long-term degradation in the wash is estimated to reach between 15 and 20 vertical meters (49 and 66 vertical feet). The three grade-control structures proposed under Alternative B would accommodate 7.5 meters (24.6 feet) of degradation (Ayres Associates 2001). As such, the three grade-control structures under Alternative B would not be a permanent solution to erosion problems in the wash. Additional stabilization measures would likely be necessary in 20 to 30 years to protect the three original grade-control structures from undermining and failure.



Source: Ayres Associates 2001

0 2083
Scale: 1 inch = 2,083 feet
(1 centimeter = 250 meters)

Tetra Tech, Inc.

Conceptual Design of Alternative B

Las Vegas Wash, Nevada

Figure 2-1

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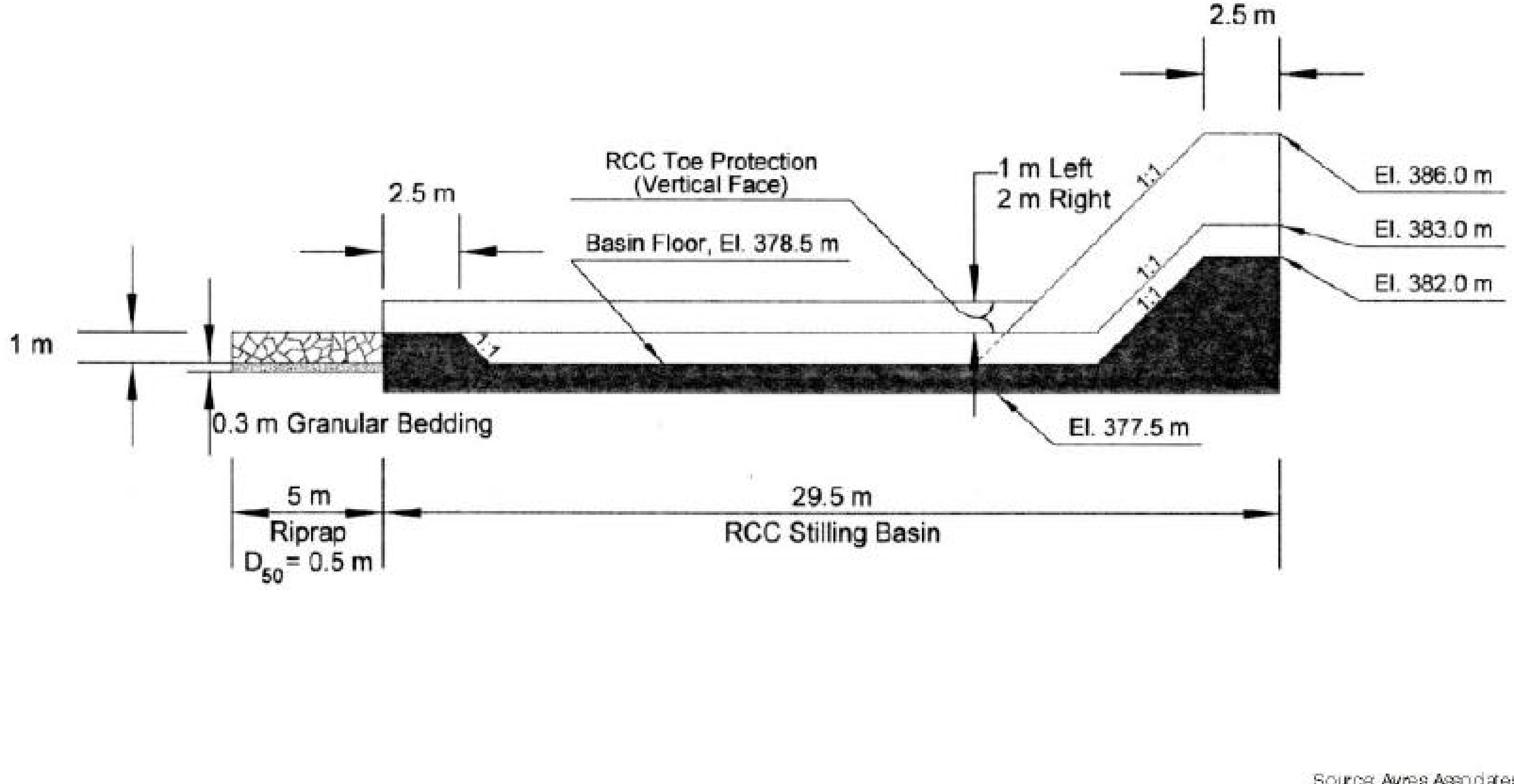

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Scale: 1 inch = 20.8 feet
(1 centimeter = 2.5 meters)

Profile of Upstream-most Grade-control Structure

Las Vegas Wash, Nevada

Tetra Tech, Inc.

Figure 2-2

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2.3.2 Canyon Wall Stabilization (Toe Protection)

The north and south canyon walls of Las Vegas Wash just upstream of the bridge are eroding and would be stabilized under Alternative B. Such stabilization, termed “toe protection,” would include placing RCC riprap in a stepped pattern, horizontally into the wash and slightly vertically up the side of the canyon wall (Figure 2-1). The RCC riprap would be constructed of durable local aggregate materials to protect the bank of the wash from further erosion. Horizontally the RCC riprap would be placed on the inside of the anticipated 100-year flood inundation limits, which were derived from hydrologic modeling of the wash. (A 100-year flood does not refer to a flood that occurs once every 100 years but to a flood level with a one percent chance of being equaled or exceeded in any given year.) Vertically the top of the RCC riprap would be set slightly above the 100-year flood elevation. The vertical bottom of the riprap would be low enough to accommodate a shift in the low-flow channel and to allow for local scour, which is currently estimated at a minimum of 2.0 meters (6.6 feet) below the current low-flow thalweg. However, deeper embedment in the streambed could be required to protect the riprap from local scour, a determination that would be made during final design. Toe protection would keep the north pier out of the 100-year floodplain and therefore would protect that pier from local scour during the 100-year flood and smaller floods. Based on local conditions, toe protection design could require modification during final design (Ayres Associates 2001).

In summary, the RCC riprap used for toe protection generally would not be visible because it would be mostly underwater. The overall purpose of toe protection would be to protect the stream banks and canyon walls from further erosion and undercutting just upstream of the Northshore Road Bridge.

2.3.3 Tributary Stabilization

The tributary that enters Las Vegas Wash on the south bank just downstream of the bridge also would require stabilization to keep it from threatening the south abutment fill. Figure 2-1 shows a stepped RCC chute intended to stabilize the tributary. The downstream end of the chute would tie into the toe protection described above for the south canyon wall immediately upstream of the bridge. The design of the tributary stabilization also would require RCC riprap on the bed of the wash to prevent local scour from the tributary. This riprap would be extended upstream under the bridge to protect the south pier and the toe protection from undermining due to local scour (Ayres Associates 2001).

2.3.4 Access Route

The construction access route for haul trucks during the stabilization effort in 1997 would be used once again as the access route for construction equipment associated with Alternative B. The route is approximately 0.8-kilometer (0.5-mile) long and is in the wash located directly north of and parallel to Las Vegas Wash (Figure 2-3). The access route is approximately 2.4 meters (8.0 feet) wide, although a portion of the route within Las Vegas Wash has been washed and no longer exists. Existing conditions of the route is described in more detail in Section 3.

2.3.5 Schedule

If Alternative B is selected for implementation, the Federal Lands Highway Program would fund construction. Construction would commence in November 2001 and is anticipated to take approximately four months.

2.4 MITIGATION AND MONITORING

Mitigation measures are specific actions designed to minimize, reduce, or eliminate impacts of alternatives and to protect NRA resources and visitors. Monitoring activities are actions to be implemented during or following construction. Unless otherwise noted, the following measures will be implemented under Alternative B. These measures are assumed in the analysis of environmental consequences for the alternative to which they apply (Section 4).

2.4.1 Public Safety

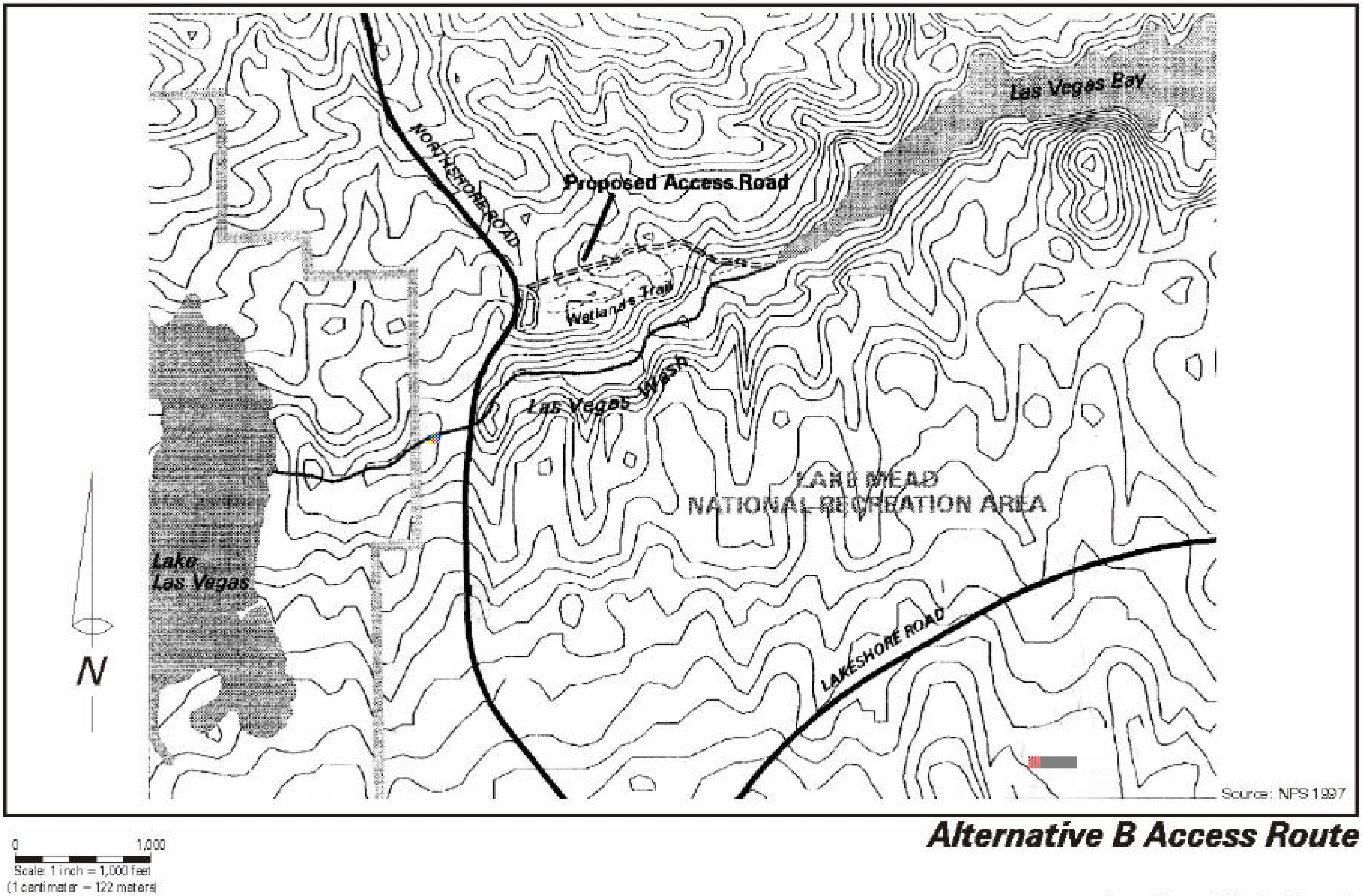
Bridge Safety

If the No Action Alternative is selected, or if Alternative B is selected and construction is delayed beyond 2001, then safety measures will be developed and implemented in the short term (i.e., until long-term stabilization measures are implemented). Flows in this reach of Las Vegas Wash are regulated by the Lake Las Vegas dam upstream, which is controlled by Lake Las Vegas Resort. The Clark County Regional Flood Control District (Flood Control District) has a flood warning system for monitoring floods in Las Vegas Wash. A warning protocol would be developed among the Flood Control District, the dam operators at Lake Las Vegas Resort, and the NPS to prevent use of the bridge should it become unsafe. For instance, a protocol could be instituted whereby the bridge would be closed whenever Lake Las Vegas dam is expecting to release flows from the auxiliary spillway. Such a protocol would require the Lake Las Vegas dam operators to notify the NPS and for NPS personnel to be trained on bridge closure procedure. Swing gates and road closure signs at the north and south ends of the Northshore Road Bridge would be required to implement a closure.

The warning and closure approach would be augmented by monitoring and frequent inspection of the bridge. Monitoring would include float-out devices at critical points along the base of the canyon walls and tilt meters on the bridge structure. These devices, combined with training and a well-developed warning protocol, would protect against injury and loss of life should the bridge become unsafe or if it were to collapse before long-term stabilization solutions were implemented.

Visitor Safety

During construction, NRA visitors will be routed away from construction areas, including the construction access route. Barricades will be placed around construction areas to prevent visitor entry, and entry to the Wetlands Trail will be blocked. If necessary, Northshore Road will be closed temporarily, for periods of no longer than 30 minutes, and appropriate signs will be posted notifying visitors of its closure. Only construction and haul vehicles will be allowed to use the construction access route, except during emergencies.



Alternative B Access Route

Las Vegas Wash, Nevada

Tetra Tech, Inc.

Figure 2-3

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2.4.2 Natural Resources

Geology, Topography, and Soils

A qualified geologist will assess the toe protection project area near the bridge before construction begins to determine if toe protection measures would result in canyon wall failure.

Water Resources

Best management practices (BMPs) are means of preventing or reducing nonpoint source pollution in the Las Vegas Wash watershed and of minimizing soil loss and sedimentation. BMPs will minimize impacts to Las Vegas Wash and will include all or some of the following features, depending on site-specific requirements:

- Locating waste and excess excavation outside the riparian area to avoid sedimentation;
- Prior to construction, installing silt fences, straw bale barriers, temporary earthen berms, temporary water bars, sediment traps, stone check dams, brush barriers, or other equivalent measures, including installing erosion-control measures around the perimeter of stockpiled fill material;
- During construction in Las Vegas Wash, diverting wash base flows around each excavation area to create drier construction work areas that are contained from the watercourse. This will minimize construction-related sediment delivery to the watercourse. Each excavation area will be dewatered as necessary, and erosion-control measures will be installed at the outflow of the dewatering device to minimize sediment delivery to the water course;
- Conducting routine water-quality monitoring of Las Vegas Wash during construction to assess effectiveness of erosion-control measures;
- Conducting regular site inspections throughout the construction period to ensure that erosion-control measures were properly installed and function effectively;
- Properly storing, using, and disposing of chemicals, fuels, and other toxic materials; and
- Refueling construction equipment in upland areas only, to prevent fuel spillage near water resources.

Wetlands

The Las Vegas Wash Wetland Enhancement Project will be adopted. The goals and objectives of this project are to actively introduce desired native wetland and riparian plants that are capable of sustaining a viable wetland community that promotes a high degree of plant diversity and associated wildlife habitat.

The desirable plant species to be planted on approximately 4 hectares (10 acres) include emergent species such as spikerush (*Eleocharis* spp.), bulrush (*Scripus* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), and riparian plants such as willow (*Salix exigua* and *Salix gooddingii*), cottonwood (*Populus fremontii*), and mesquite (*Prosopis pubescens* and *Prosopis glandulosa*)

Only native plants will be used. Emergent species may be collected from harvesting local sources including Lake Mead, Lake Mohave, and various springs and surrounding areas. Plant material may be propagated at the nurseries for Lake Mead and the Nevada Department of Conservation and Natural Resources, Division of Forestry. Emergent plants may be directly transplanted into the project area immediately following harvest or may be held and further propagated at the Lake Mead nursery.

Planting techniques include rhizomes or tubers, seedlings, rooted containers, root/rhizome/plant clumps, and seeds. Plant collection will occur in the late fall or winter. Transplanting will occur preferably in the winter during plant dormancy. Labor will be performed by Lake Mead staff, seasonal work crews, and volunteers.

Specific transplant locations will be determined after the water levels at the structures have reached a consistent and desirable elevation. Emergent species will be planted in water less than 0.6-meter (2 feet) deep, and riparian species will be planted along the shoreline within or near the zone of soil saturation. Densities will vary depending on the species and allowable transplant habitat. In general, transplanting will occur in light densities since most plant species used reproduce by rhizomes and root suckering and are capable of rapid colonizations.

Photo-point monitoring has been established in the wash. Photo points will document revegetation efforts, and the transplanted plants will be monitored for survival rates. A water level monitoring system will be established to document surface elevations.

Vegetation

Undesirable species, such as tamarisk (saltcedar) (*Tamarix ramosissima*), will be aggressively controlled in high-priority areas. Other undesirable species will be monitored, and control strategies will be initiated if these species occur.

Riparian vegetation will be avoided, as feasible. To prevent the introduction of and to minimize the spread of exotic vegetation and noxious weeds, the following measures will be implemented:

- Minimize soil disturbance;
- Pressure-wash all construction equipment before it is brought into the NRA;
- Limit vehicle parking to existing roads, parking lots, or the access route;
- Obtain all fill, rock, or additional topsoil from the project area;

- § Revegetate all disturbed areas immediately following construction activities with adapted native seed or plants that are found in adjacent areas and that are certified as weed free; and

- § Monitor all disturbed areas for two to three years following construction to identify noxious weeds or exotic vegetation. Remedial and control measures will be implemented as needed and could include mechanical, biological, chemical, or additional revegetation treatments, in accordance with NPS-13, Integrated Pest Management Guidelines.

To maximize restoration efforts after completion of construction activities, the following measures will be implemented:

- § Salvage topsoil from access route construction for reuse during restoration on disturbed areas to ensure proper revegetation;

- § Salvage native vegetation for subsequent replanting in the disturbed area; and

- § Monitor revegetation success for three years following construction; implement remedial and control measures as needed.

Herbicide application to control vegetation will be restricted to chemicals that do not pollute or persist in wetland, riparian, and aquatic areas. Potential drift and runoff from chemical application will be considered, as will appropriate methods and timing of application.

Special Status Species

Although there are no threatened, endangered, or other special status species known to occur in the project area, species evaluations of the project area will be performed as specified below. In addition, informal consultation with US Fish and Wildlife Service (USFWS) will be conducted to finalize the determination of no effect, or not likely to adversely affect, threatened or endangered species.

To avoid impacts to desert tortoise (*Gopherus agassizii*), construction will not commence until November 2001, after desert tortoise active fall season. Upland areas of the project area will be resurveyed for desert tortoise and burrows just before construction begins in any given area. The intent of these surveys is to remove all tortoises on the project site and to identify burrows that could be avoided during construction. Additional desert tortoise mitigation and monitoring measures that will be followed are outlined in Appendix A.

The measures described below summarize mitigation and monitoring to avoid impacts to the southwestern willow flycatcher (*Empidonax traillii extimus*). The southwestern willow flycatcher typically arrives in the region in late April. If construction is not completed by that time, a qualified biologist will survey the project area for the southwestern willow flycatcher. If this species is detected in the project area, construction will be suspended, and the NPS will contact USFWS to jointly develop a plan to avoid impacts. Any other migratory bird nests discovered during this process will be flagged and avoided.

Air Quality

During construction, water will be applied as necessary to minimize the release of dust. Low-sulfur fuel (0.05 percent by weight) will be used for diesel equipment. Gasoline-powered equipment will be used when available, and construction equipment will be properly tuned.

2.4.3 Cultural Resources

If undiscovered cultural resources are encountered during construction activities, activities in the immediate area will be stopped. The NPS will consult the appropriate parties according to 36 CFR 800.13 and, as appropriate, portions of the Native American Graves Protections and Repatriation Act of 1990.

2.4.4 Visual Resources

Stabilization features will be designed to match the color of the natural substrate in the project area as closely as feasible.

2.4.5 Visitor Use and Experience

Any necessary closures of Northshore Road to conduct construction under Alternative B will be temporary and will occur on weekdays, if practicable. The NPS will post additional signs in the area with recommendations that body contact with wash water be avoided.

2.5 PERMIT REQUIREMENTS

No permits would be required for the No Action Alternative. Alternative B would comply with EO 11988 (Floodplain Management), EO 11900 (Protection of Wetlands), and the Fish and Wildlife Coordination Act of 1934, PL 85-624, as amended (16 US Code §§ 661 - 666c). The following approvals and permits from jurisdictional agencies will be required before Alternative B could be implemented:

- US Army Corps of Engineers—Nationwide or Individual Permit, pursuant to Section 404 of the Clean Water Act, for minor discharges of dredged or fill material in waters of the US.

- Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Quality Planning—Water Quality Certification, pursuant to Section 401 of the Clean Water Act.

- Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Pollution Control—General Rolling Stock Permit for operating equipment in a body of water.

- Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Pollution Control—General Construction Stormwater Permit for authorization to discharge stormwater associated with construction activity, under the National Pollutant Discharge Elimination System.

- Nevada State Historic Preservation Office (SHPO)—Concurrence that no historic properties will be affected and that effects from the project on historic and archaeological resources have been taken into account, in accordance with Section 106 of the National Historic Preservation Act (NHPA).

- Advisory Council on Historic Preservation (ACHP)—Opportunity to comment on the project about no effect to historic properties and that effects from the project on historic and archaeological resources have been taken into account, in accordance with Section 106 of the NHPA.

- USFWS—Informal consultation regarding threatened and endangered species, in compliance with Section 7 of the Endangered Species Act of 1973, as amended.

- Clark County Health District, Air Pollution Control Division—Dust-control permit for construction activities, including surface grading and trenching.

2.6 ALTERNATIVES CONSIDERED BUT DISMISSED

The following alternatives were considered but were not fully developed for the reasons provided.

2.6.1 Construct Grade-Control Structures Using Sheet Pile

The option of constructing grade-control structures with sheet pile instead of RCC was explored. This option was dismissed because the characteristics of the bedrock within the wash would make it infeasible. Plus, there are few local contractors with the extensive experience in sheet pile construction necessary to complete the project successfully (Ayres Associates 2001).

2.6.2 Close Segment of Northshore Road and Demolish Bridge

This alternative would include closing a segment of the Northshore Road and demolishing the bridge. Traffic could be diverted through North Las Vegas via Lake Mead Boulevard (Figure 1-2). This alternative was dismissed because of its inconvenience to Lake Mead NRA users because it would require users in the Las Vegas Bay and Boulder Beach areas needing a north-south connection to exit the NRA, drive to another north-south connection in eastern Las Vegas, then reenter the NRA, a detour of over 30 miles. This alternative also was dismissed because the Northshore Road Bridge is structurally in good condition and should be salvaged if possible.

2.6.3 Replace Bridge

This alternative would replace the bridge with a new structure capable of accommodating a dramatic lowering of the canyon floor and retreating of both canyon walls without threatening the bridge and its users. Such a new bridge would be constructed alongside the existing bridge, and short segments of new connecting road would be constructed to connect to the existing Northshore Road. The existing bridge would be demolished before it was undermined and collapsed because an accidental collapse could harm the new bridge or any people in the area. Accomplishing the work on the existing bridge would require temporary traffic delays and closures during the one- to two-year construction period. This alternative was dismissed because the funding required to construct a new bridge would not be fully available for approximately eight to ten years, and the existing bridge would very likely be undermined and would collapse in the meantime.

2.6.4 Modify Bridge

This concept would involve constructing new footings for the existing abutments and adding a new span at each end to create a considerably longer bridge. The wash would continue to cut a deeper and wider channel without threatening the bridge and its users. Modifying the existing bridge could conceivably be accomplished by constructing deep-drilled shafts adjacent to the existing abutments and tying the deck and abutments to the new drilled shafts. The shafts would have to be deep and strong enough to tolerate a long unsupported length when the canyon wall retreated beyond its present location. The existing abutment location then would become an intermediate bent, and a new abutment would be constructed well back from the canyon wall. Because continued degradation of the wash also would threaten the piers, it would likely be necessary to retrofit them with drilled shafts as well (Ayres Associates 2001). Work on the existing bridge would require temporary traffic delays and closures during the one- to two-year construction period. This alternative was dismissed because the funding required to modify the existing bridge would not be fully available for approximately eight to ten years, and the existing bridge would very likely be undermined and would collapse in the meantime.

2.6.5 Construct Rock Berms

This option would include constructing rock berms in the wash using larger rocks than were used in the 1996 stabilization attempt. It was hypothesized that the reason the first attempt (in 1996) to construct rock berms within the wash failed was due to the inadequate rock size. If larger rocks were to be used, the structures could prove successful. There were several reasons to dismiss this alternative. Even with the use of larger rocks, the increasing flows in the wash could cause the rock structures to wash out, and there is no guarantee that the project would be successful. Also, no large rocks are available on site. The cost of acquiring the size of rocks necessary would be substantial. Adequate funding would not be available for a period of years, during which time the existing bridge could fail.

2.6.6 Construct Riprap in Channel

This alternative was initially discussed in the first stabilization analysis in 1996. This option would include placing riprap in the channel from the Lake Las Vegas dam to below the Northshore Bridge, which would protect the channel in this area. This alternative was dismissed because riprap would destroy the habitat and vegetation in the wash, it would not allow the construction of wetlands and riparian habitat, and it would lead to increased erosion downstream of where the riprap terminates.

2.6.7 Construct Riprap on Bridge Piers

This alternative would include constructing riprap on the base of each bridge pier in the wash. It was dismissed since it would not solve the overall purpose and need of the project, which includes protecting the piers and abutments and reducing erosion in the wash.

2.7 ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is the alternative that will promote NEPA, as expressed in Section 101 of NEPA. This alternative will satisfy the following requirements:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- Assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable or unintended consequences;
- Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative B is the environmentally preferable alternative because overall it would best meet the requirements of Section 101 of NEPA. It would help stabilize Las Vegas Wash, thereby reducing erosion, improving water quality, and preserving the integrity of Northshore Road Bridge. Implementation of Alternative B also would allow for mitigation measures, such as planting new emergent and riparian vegetation and removing nonnative tamarisk, which would improve overall project area vegetation in the long term.

2.8 Comparison of Impacts

Table 2-1 summarizes the potential long-term impacts of the proposed alternatives. Short-term impacts are not included in Table 2-1 but are analyzed in Section 4.

Table 2-1
Comparison of Long-Term Impacts from Alternatives Considered

Impact Topic	Alternative A (No Action)	Alternative B (Preferred)
Public Safety	Potentially major adverse impacts	Major beneficial effects
Geology, Topography, and Soils	Moderate adverse impacts	Moderate beneficial effects
Water Resources	Minor to moderate adverse impacts	Moderate beneficial effects
Vegetation	Potentially moderate adverse impacts	Minor beneficial effects
Wildlife and Aquatic Life	Minor adverse impacts to aquatic life; Potentially moderate to major adverse impacts to wildlife and aquatic life	Minor to moderate beneficial effects
Special Status Species	Negligible adverse impacts	No impacts
Air Quality	No impacts	No impacts
Noise	No impacts	No long-term impacts
Cultural Resources	No impacts	No impacts
Visual Resources	Potentially moderate to major adverse impacts	Minor beneficial effects
Visitor Use and Experience	Minor adverse impacts	Moderate beneficial effects

Short-term impacts are not included.
Impact intensity, context, and duration are defined in Section 4.2.1, Impact Terminology.

SECTION 3
AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This section provides a description of the existing environment in the project area and the resources that could be affected by implementing the proposed alternatives. Complete and detailed descriptions of the environment and existing use at Lake Mead NRA is found in the *Lake Mead NRA Resource Management Plan* (NPS 2000) and the *Lake Mead NRA General Management Plan* (NPS 1986).

3.2 PUBLIC SAFETY

As described in Section 1, the Northshore Road Bridge is designated as scour critical. The current threat to the bridge is that as the wash channel deepens and widens, the bridge could be undermined and could collapse into the wash. Such a failure could result in loss of human life. Section 1.4 provides more information on the safety of the bridge.

3.3 NATURAL RESOURCES

Three of America's four desert ecosystems—the Mojave, the Great Basin, and the Sonoran Deserts—meet in the Lake Mead NRA. The project area is characteristic of the Mojave Desert, with low precipitation (averaging 8 to 23 centimeters per year [3 to 9 inches per year]), low humidity, and wide extremes in daily temperatures. Winters are relatively short and mild, and summers are long and hot. The prevailing wind direction is from the south.

3.3.1 Geology, Topography, and Soils

The Northshore Road Bridge over Las Vegas Wash is in an area underlain by bedrock of the Muddy Creek Formation and varying thicknesses of unconsolidated Quaternary age alluvium and colluvium. Las Vegas Wash has generally occupied the same position within the Las Vegas Valley for millions of years. Over this period, the wash has undergone several cycles of degradation and aggradation. The most recent period of aggradation ended approximately 30 years ago when rapid urbanization within the watershed initiated another cycle of degradation. The transformation from an ephemeral to a perennial stream, with mean daily flows increasing proportionately with increasing development, has resulted in substantial channel degradation and widening (Ayres Associates 2001).

The Las Vegas Valley drainage area has extensive vertical relief. The maximum elevation is nearly 3,600 meters (11,811 feet) in the mountains west of Las Vegas, and the minimum elevation is about 366 meters (1,201 feet) where the Las Vegas Wash enters Lake Mead. The canyon walls of Las Vegas Wash in the project area are vertical or nearly vertical and reach over 9.0 meters (29.5 feet) high (Ayres Associates 2001).

General project area soils are characteristic of typical Mojave Desert wash communities and consist of sands and gravels (NPS 1997). Soils of Las Vegas Wash are alluvially-deposited sands, gravels, and some boulders (Peterson 1996).

3.3.2 Water Resources

The Las Vegas Valley gets drinking water from two sources: groundwater and surface water. Groundwater, which annually accounts for 15 percent of the total water supply, is obtained from an aquifer beneath the valley. Eighty-five percent of drinking water for the Las Vegas Valley is diverted from the Colorado River at Lake Mead. Reclaimed water, which is treated wastewater, also provides an additional water resource and is used for turf irrigation at several sites throughout the valley. Additionally, several casinos in Las Vegas treat and use shallow groundwater and gray water for outdoor water features (Las Vegas Water Quality 2001a). Gray water is residential wastewater from washing machines, bathtubs, showers, and sinks.

Flows in Las Vegas Wash

Las Vegas Wash begins northwest of Las Vegas, flows through the Las Vegas metropolitan area, and ends in Las Vegas Bay of Lake Mead (approximately 1.6 kilometers [1.0 mile] downstream of the Northshore Road Bridge) at the Lake Mead NRA (Figures 1-1 and 1-2). Las Vegas Wash flows year-round because it is the outflow for an average of 579 million liters (153 million gallons) per day of treated wastewater, urban runoff (the result of landscape overwatering and surface street runoff), shallow groundwater (water less than 9 meters [30 feet] below land surface that flows to the lowest part of the valley then seeps into the wash), and stormwater from the entire Las Vegas Valley (LVWCC 2001a, 2001e). Its total drainage area is approximately 5,700 square kilometers (2,200 square miles), and its average base flow due to wastewater discharge is about 6.8 cubic meters per second (240 cubic feet per second) (LVWPCT 2000).

Directly upstream of the project area portion of the wash is Lake Las Vegas, which was formed by a dam built in the early 1990s (Figure 1-3). The lake was filled with water from Lake Mead and was not formed by Las Vegas Wash water. Low flows (up to 32.8 cubic meters per second [1,158 cubic feet per second]) in the wash bypass the lake through a pair of 2.1 meter- (84.0-inch-) diameter concrete pipes buried underneath the lake; this means that wash water is not contained in the lake. However, flood flows exceeding the capacity of the bypass pipes do enter Lake Las Vegas. Flows in the project area portion of the wash are regulated by the Lake Las Vegas dam. When necessary, flood flows from the lake are released via one or more of the three spillways at the dam. Flow from any of the spillways enters the wash as virtually clear water (Ayres Associates 2001).

Large floods occurred in July and September 1998 and again in July 1999. The July 1999 flood was the 100-year storm event and is the flood of record, with an estimated peak discharge rate of 481.4 cubic meters per second (17,000 cubic feet per second) just upstream of Lake Las Vegas. This is the highest discharge rate ever recorded in the wash. Prior to that flood, the September 1998 flood had been the flood of record, with a peak discharge rate of about 270.7 cubic meters per second (9,560 cubic feet per second). During both these floods, flows were released from one of the dam spillways (Ayres Associates 2001).

Discharges to Las Vegas Wash

The three permitted dischargers of treated wastewater to Las Vegas Wash are the city of Las Vegas, the Clark County Sanitation District, and the city of Henderson; all of which discharge year-round. The concept of "return flow credits" encourages municipal wastewater managers to return as much water as possible to the Colorado River system. Return flow credits enable the various entities to withdraw or divert additional water from the Colorado River system in proportion to the amount they return as wastewater. No credit is permitted for stormwater runoff. Credit is acquired by maximizing waste flows and minimizing evaporation, by discharging and recharging groundwater basins, and by polishing effluent by constructing wetlands or other means (NPS 1996).

Water Quality

The primary water quality issues of concern in Las Vegas Wash include sediment, selenium, perchlorate, nutrient loading, and urban chemicals. Sediment transport in the wash ranges from 50 to 1,600 tons per day, as measured by total suspended solids, and varies depending upon the time when samples are collected. Some sediment settles out of the water as it pass through a settling basin before entering the underground pipes under Lake Las Vegas (LVWPCT 2000). As such, sediment loads in the project area portion of the wash is typically lower than upstream of Lake Las Vegas.

Elevated selenium concentrations raise concerns regarding the potential for bioaccumulation in the food chain and may be related to adverse effects on some fish and wildlife species found in areas with elevated selenium concentrations. Elevated selenium concentrations occur near the entrance to the Clark County Wetlands Park (LVWPCT 2000).

Perchlorate was detected in Las Vegas Wash and Lake Mead in 1997. It was manufactured by two Las Vegas Valley companies between the 1950s and 1997. The source for perchlorate in Lake Mead is intercepted shallow groundwater in Las Vegas Wash. Perchlorate values near the project area were measured at 1,050 parts per billion in 1997 (LVWPCT 2000). The normal levels at the water intake facilities are between 11 and 14 parts per billion, while state and federal standards are set between 18 and 35 parts per billion.

Urban chemicals include any type of chemical used in homes or businesses, such as pesticides, solvents, herbicides, gas products, oil, and grease. Urban chemicals can reach Las Vegas Wash as intercepted shallow groundwater or as surface flow resulting from overirrigation and storm events (LVWPCT 2000).

Other water quality concerns that have been documented in the Las Vegas Wash in the past five years include pesticides, heavy metals, human pathogens, and hydrocarbons. Studies conducted as a part of the US Geological Survey's nationwide Assessment of Water Quality Program found fish at the confluence of the wash and Lake Mead to show high incidence of endocrine disruption. Due to water quality concerns, the Nevada Department of Environmental Protection initiated the interagency Lake Mead Water Quality Forum to coordinate monitoring, to identify issues, and to seek solutions to water quality problems. The forum will be developing long-term water discharge plans over the next five years, with the goal of improving the quality of water entering Lake Mead (NPS 2000).

Water is routinely sampled for quality, relative to state standards for wastewater discharge. Water quality also is being monitored by various groups, including the Las Vegas Valley Dischargers, Reclamation, Southern Nevada Water Authority, and Las Vegas Valley Stormwater Quality Management Committee. Reclamation has continuously monitored water quality of the wash for 12 years. Its data show that the temperature of the wash remains relatively stable throughout the year but increases from 20 degrees Celsius (68 degrees Fahrenheit) to nearly 28 degrees Celsius (82 degrees Fahrenheit) by mid-summer (LVWPCT 2000).

Since August 2000, water quality also has been monitored monthly by the Las Vegas Wash Coordination Committee. There are eight sampling sites along the wash, one of which is near Northshore Road. Parameters that are measured include water temperature, dissolved oxygen concentration, pH, and electrical conductivity. Samples for heavy metals, cations-anions, perchlorate, nutrients, and bacteria are also collected but less frequently (LVWCC 2001f). Results of sampling near the project area were not available at the time of EA publication (Las Vegas Water Quality 2001b).

Floodplains

A floodplain is typically a strip of relatively flat and normally dry land alongside a stream, river, or lake that is covered by water during a flood. In the case of Las Vegas Wash, the floodplain has the form of a canyon. The Northshore Road Bridge piers are within the floodplain and the abutments are outside the floodplain. The tops of the canyon walls just upstream of the bridge are indicative of the floodplain elevation before substantial degradation occurred. Downstream of the bridge, the floodplain is characterized by a high terrace on one bank and an inset floodplain on the other bank. There is also an inset floodplain upstream of the bridge. Sediments that make up the inset floodplain are unconsolidated sand and gravel, which are highly susceptible to erosion (Ayres Associates 2001).

Wetlands

Multiple wetlands alongside the 19-kilometer- (12-mile-) long Las Vegas Wash are a mechanism for improving water quality as urban flows enter the wash en route to Lake Mead and the Colorado River system. Some of these wetlands are discussed in Section 1.6, Relationship to Other Planning Projects. Since the mid-1970s, wetlands associated with the wash have decreased from 809 hectares (2,000 acres) to less than 121 hectares (300 acres) because of deepening of the wash channel, which drained some adjacent wetlands (LVWCC 2001b; LVWPCT 2000). Wetlands within Las Vegas Wash in the NRA have been impacted by the continued degradation and deepening of the wash channel. The only wetlands in the project area are fringe wetlands, occurring alongside the wash channel. Under the Cowardin classification system (Cowardin et al. 1979), these wetlands are considered a combination of palustrine emergent and scrub-shrub wetlands. Where there is high moisture, there are patches of cattail and common reed (*Phragmites*), mixed with nonnative tamarisk and wetland annual plants. In the drier areas the primary vegetation is saltbush (*Atriplex* spp.) and arrow weed (*Pluchea sericea*).

3.3.3 Vegetation

Las Vegas Wash is composed of a stream riparian community. The primary vegetation is nonnative tamarisk, although nonnative tamarisk is not a state or federally listed noxious weed (USDA 2001a, 2001b). It is an aggressive species that creates thick monocultures, exhibits very little diversity in height or composition, and provides less-suitable habitat for wildlife than does native vegetation. Estimates of tamarisk in the entire Las Vegas Wash show that, since 1975, tamarisk has increased from approximately 20 percent of vegetation in the wash to approximately 80 percent of total vegetation (LVWPCT 2000). Other plant species found in the Las Vegas Wash portion of the project area include salt-tolerant herbs such as sedges, rushes, cattail (*Typha domingensis*), and salt grass (*Distichlis spicata*) (NPS 1996).

The proposed access route is located a predominantly barren wash (Teague 1991). Plant species found in this wash include creosote bush (*Larrea tridentata*), catclaw (*Acacia greggii*), desert fir, brittlebush (*Encelia farinosa*), beavertail cactus (*Opuntia basilaris*), and cottontop cactus (*Echinocactus polycephalus*) (NPS 1997).

3.3.4 Wildlife and Aquatic Life

The riparian vegetative community described above currently has a relatively low value to wildlife because of the lack of well-developed plant diversity and structure due to the presence of the invasive, nonnative tamarisk. However, riparian shrubs do provide some protective cover from nearby disturbances associated with recreation and Northshore Road, as well as nest sites for small birds. A variety of wildlife uses the wash, including the black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), round-tailed ground squirrel (*Spermophilus tereticaudus*), and a variety of songbirds and lizards. Amphibians that inhabit the wash include red-spotted toad *(Bufo punctatus)*, wood house toad *(Bufo woodhousei)*, northern leopard frog *(Rana pipiens)*, and bullfrog *(Rana catesbeiana*)

(LVWPCT 2000). Fish species that have been documented include carp *(Cyprinus carpio)*, fathead minnow *(Pimephales promelas)*, and red shiner *(Notropis lutrensis)* (LVWPCT 2000).

Wildlife that inhabit the vicinity of the wash in which the proposed access route is located includes many species of lizards such as collared lizards (*Crotaphytus collaris*), and mammals including round-tailed ground squirrel, black-tailed jackrabbit, and desert cottontail (*Sylvilagus audubonii*) (NPS 1997).

3.3.5 Special Status Species

No Nevada-listed or federally listed threatened or endangered species have been documented in Las Vegas Wash or the proposed access route wash within the project area, nor is any critical habitat designated in the project area. However, there are protected species that could occur in or near the project area. The following information sources were used to research which federal and state special status species could occur in Clark County:

- Threatened and Endangered Species System Listings by State and Territory, as of June 13, 2001 – Nevada (USFWS 2001a);
- Nevada's Endangered, Threatened, and Candidate Species by County, April 10, 2000 (USFWS 2000);
- Listed Species and Species of Concern within the Area Proposed to be Covered Under the Lake Mead National Recreation Area Lake Management Plan, May 24, 2001 (USFWS 2001b);
- Listed and Other Species of Concern That May Occur within the Vicinity of the Las Vegas Wash, Clark County, Nevada (File Numbers NPS 3-2, 1-5-96-SP-217), June 20, 1996 (USFWS 1996);
- Clark County Rare Species List (February 15, 2001), Nevada Natural Heritage Program (NVNHP 2001); and
- Resource Base Inventory—Birds, Mammals, Reptiles and Amphibians, and Plants, National Park Service, Lake Mead National Recreation Area, May 14, 2001 (NPS 2001a).

The extensive lists of species contained in these sources were narrowed to the species included in Table 3-1, based on analysis of the species' documented occurrences and specific habitat and based on available literature. All species identified by USFWS in 1996 for the previous wash stabilization project are included.

Table 3-1
Special Status Species
Potentially Occurring in or Adjacent to the Project Area

SPECIES COMMON NAME (*SCIENTIFIC NAME*)	FEDERAL STATUS	STATE STATUS	HABITAT SUITABILITY
Birds			
Western burrowing owl *(Athene cunicularia hypugaea)*	Species of Concern	Protected	Habitat is open grassland. Has been recorded in Las Vegas Wash but not project area.
Southwestern willow flycatcher (*Empidonax traillii extimus*)	Endangered	Protected	Prefer habitat with varying canopy cover generally dominated by willows. Project area is marginally suitable habitat. Species has been recorded in Las Vegas Wash during migration but not in project area.
American peregrine falcon *(Falco peregrinus)*	None (delisted)	Protected	Habitat is steep cliffs or canyons near water. No known occurrences in Las Vegas Wash. May occur as casual migrants.
American bald eagle *(Haliaeetus leucocephalus)*	Threatened (proposed for delisting)	Protected	Habitat is typically along large lakes or rivers with trees, snags, or cliffs for nest building. No recorded nesting within Lake Mead NRA. Nevada Natural Heritage Program does not list species for Clark County. May occur as casual migrants during winter.
Yuma clapper rail *(Rallus longirostris yumanensis)*	Endangered	Protected	Habitat is marshes with predominately dense cattail and bulrush vegetation but may also inhabit tamarisk marsh thickets. Has been observed in wash.
Mammals			
California leaf-nosed bat *(Macrotus californicus)*	Species of Concern	None	Habitat is upland desert scrub. Warm caves or abandoned mines are required for roosting habitat. Sightings have been made in Las Vegas Bay area.
Spotted bat *(Euderma maculatum)*	Species of Concern	Protected	Habitat requirements not well documented. Most captures over waterbodies in open scrub desert. Has been documented in Lake Mead NRA.

SPECIES COMMON NAME (*SCIENTIFIC NAME*)	FEDERAL STATUS	STATE STATUS	HABITAT SUITABILITY
Reptiles			
Desert tortoise (*Gopherus agassizii*)	Threatened	Watch List	Occurs near project area, although none have been found in Las Vegas Wash or project area. Most of project area considered unsuitable habitat. June 2001 surveys found no presence or sign of species.
Banded Gila monster *(Heloderma suspectum cinctum)*	Species of Concern	Protected	Habitat is desert scrub, rocky outcrops, and grasslands. Potential habitat in Las Vegas Bay, although not likely to occur in project area.
Chuckwalla *(Sauromalus obesus)*	Species of Concern	None	Upland desert scrub habitat is required. Not likely to occur in project area.
Fish			
Razorback sucker (*Xyrauchen texanus*)	Endangered	Protected	Known to occur in Lower Colorado River Basin. Documented in Las Vegas Bay.
Bonytail chub (*Gila elegans*)	Endangered	Protected	Known to occur in Lower Colorado River Basin. Not known to occur in or near project area.
Plants			
Las Vegas bearpoppy *(Arctomecon californica)*	Species of Concern	Critically Endangered	Upland desert scrub with gypsum soils is required. Not likely to occur in project area.

Sources: USFWS 1996, 2000, 2001a, 2001b; NVNHP 2001.

The project area contains marginally suitable habitat for the southwestern willow flycatcher, which breeds primarily in dense riparian vegetation, such as willow, cottonwood, and tamarisk thickets. The project area contains small tamarisk thickets, which could be used by the species in migration or for nesting. However, both of these possibilities are relatively unlikely. Although the species has not been recorded in the project area, it has been rarely observed in the wash (LVWPCT 2000) and near Pearce Ferry in the eastern portion of the Lake Mead NRA. No nests have been documented in or near the wash. Southwestern willow flycatchers are neotropical migrants that arrive in the region in late April, lay eggs in May and June, and migrate out of the region after breeding in July and August (LCRMSCP 2000).

Yuma clapper rail habitat consists of marshes with predominantly dense cattail and bulrush but also could include tamarisk marsh thickets. This species has been observed in the wash but not in the project area. No marsh habitat exists in the project area, so occurrence of Yuma clapper rail is unlikely. The species could pass through the project

The razorback sucker has been documented in Las Vegas Bay, in scattered areas around Lake Mead, and in the extreme lower portion of Las Vegas Wash (NPS 1996; Abate 2001). Its habitat is in pools, eddies, and backwaters, and it spawns in shallow water with a gravel substrate during the winter (NPS 1996). The species has not been documented as far upstream in the wash as the project area; as such, the species is unlikely to occur in the project area but could occur downstream.

The bonytail chub is not known to occur in Las Vegas Wash or Lake Mead. Its presence in or adjacent to the project area is highly unlikely.

3.3.6 Air Quality

Under the Clean Air Act Amendments of 1990, the US Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six "criteria pollutants": lead, ozone, sulfur dioxide, oxides of nitrogen, carbon monoxide (CO), and particulate matter smaller than 10 microns in diameter (PM_{10}). Based on air quality monitoring data, a portion of Clark County (Las Vegas planning area's Hydrographic Basin 212) has been designated as being in serious nonattainment with the NAAQS for PM_{10} and CO (EPA 2001). The project area is not located within the nonattainment boundary (Langston 2001).

The Nevada Division of Environmental Protection, Bureau of Air Quality has air quality jurisdiction over all counties in Nevada, except for Washoe and Clark counties, which have their own distinct jurisdictions. The Air Quality Division of the Clark County Health District is the regulatory and enforcement agency for air quality matters in Clark County.

The NPS, Air Resources Division and USFWS, Air Quality Branch together have responsibility for approximately 378 park units and 503 refuges, for which the Clean Air Act designates Class I and Class II air quality areas. Class I includes the following areas that were in existence as of August 7, 1977: national parks over 2,428 hectares (6,000 acres), national wilderness areas and national memorial parks over 2,024 hectares (5,000 acres), and international parks. Class II areas are parts of the country protected under the Clean Air Act but identified for somewhat less stringent protection from air pollution damage than a Class I area, except in specified cases (NPS 2001b, 2001c). Lake Mead NRA is designated as a Class II air quality area, and air quality in the region is generally good. Most reductions in air quality are due to air flows from the Las Vegas Valley west of the NRA (NPS 2001d).

Clean Air Act Conformity Requirements

The EPA has promulgated rules that establish conformity analysis procedures for transportation-related actions and for other (general) federal agency actions. The EPA general conformity rule requires a formal conformity determination document for federally sponsored or funded actions in nonattainment areas or in certain designated maintenance areas when the total direct and indirect net emissions of nonattainment pollutants (or their precursors) exceed specified *de minimis* levels. Since the project area is not within a nonattainment area, Clean Air Act conformity does not apply.

3.4 NOISE

Noise-sensitive receptors are those locations where activities that could be affected by increased noise levels occur and include locations such as residences, motels, churches, schools, parks, and libraries. Existing noise levels are determined for the outdoor living area at sensitive receptors. There are no sensitive receptors in the project area, other than the Lake Mead NRA itself. The dominant noise source in the project area is automobile and truck traffic on Northshore Road.

3.5 CULTURAL RESOURCES

Humans have lived in the southern Nevada area for about 12,000 years. The early prehistoric peoples were hunter-gatherers. Around 2,000 years ago, small-scale agriculture was developed around springs and along dependable waterways. Historically several Euro-American groups have used the area and include explorers, traders, settlers, miners, and ranchers (NPS 2001d).

The Las Vegas Wash is a natural corridor to Lake Mead, as it was to the Colorado River before construction of Hoover Dam in 1935. This route was traditionally used by the Southern Paiute and possibly other prehistoric peoples (NPS 1996). Archaeological sites along the Las Vegas Wash suggest that the area has been inhabited since around AD 600 and possibly earlier (LVWCC 2001g). The wash plays an important role in the Southern Paiute creation story, and the entire wash is considered a sacred site. Flood flows in 1976 removed between 6 and 9 meters (20 and 30 feet) of alluvial sediments throughout most of the project area and damaged the previous bridge, thereby requiring construction of the current bridge. These changes to the historic appearance and configuration of the wash, combined with more recent residential and other development, have altered the historic appearance of the area (NPS 1996).

Several cultural resource inventories have been conducted in and adjacent to the project area. In 1976, a corridor was inventoried along Northshore Road before the construction of the existing bridge (Stewart 1976). Two sites were located south of Las Vegas Wash and west of Northshore Road. Both sites are outside the area of potential effect (APE) for this project. In 1991, the Las Vegas Wash Wetlands Trail was inventoried; no cultural resources were located (Teague 1991). In 1996 and 1997, the APE for the previous bridge stabilization and wetlands restoration project was inventoried; again no cultural resources were located (Peterson 1996; Daron 1997).

The EA for the previous stabilization project (NPS 1996) noted that the NPS was concerned about the significance of Las Vegas Wash to Native Americans. The 1996 EA and a consultation letter (O'Neill 1996a) were sent to the Las Vegas Paiute Tribe, Pahrump Paiute Tribe, Kaibab Paiute Tribe, Moapa Band of Paiutes, Shivwits Paiute, and Chemehuevi Indian Tribe. This correspondence was followed up by telephone calls and a second letter (O'Neill 1996b). None of the Native American groups expressed any concern about the project.

3.6 VISUAL RESOURCES

The project area includes one trailhead and the Wetlands Trail. Other than a gravel parking area, no facilities are provided at the trailhead. Northshore Road and bridge, the trailhead and trail, and the Lake Las Vegas dam are the apparent human-made features within the project area. The scenic quality upstream of the bridge is relatively low because the view includes the dam and associated human-made structures. Downstream scenic quality is more natural and includes the wash and Las Vegas Bay.

The *Lake Mead NRA General Management Plan* (NPS 1986) provides management direction for lands by designating some lands as significant natural features. The project area is not designated as a significant natural feature.

3.7 VISITOR USE AND EXPERIENCE

Lake Mead NRA was designated as the first NRA in 1964. It is composed of 595,041 hectares (1,470,328 acres) of federal land and 10,254 hectares (25,338 acres) of nonfederal land, for a total of approximately 605,296 hectares (1.5 million acres) (NPS 2001e). Lake Mead NRA users include boaters, swimmers, fishermen, hikers, photographers, roadside sightseers, backpackers, and campers. Recreation visits in 1999 totaled just over nine million (NPS 2001e).

Within the project area, the existing Wetlands Trail provides visitors with opportunities for viewing wildlife and plant species in the vicinity of the trail. The trail originates from a gravel parking area just north of the Northshore Road Bridge and leads down the bluffs on the north side of the wash. The trail is accessible only by foot because of the elevation change between the parking area and the wash bottom. Once in the wash, the trail system follows the north bank of the wash and is composed of a 0.9-meter- (3.0-foot-) wide path. The trail system is approximately 2.4 kilometers (1.5 miles) long (NPS 1996). The wetland that was the original destination of the trail no longer exists.

The general public uses the Wetlands Trail and project area for a variety of recreational activities, including bird and wildlife watching and hiking. Visitor use in the vicinity of the project area used to be higher than it is currently, primarily because of the environmental education classes that once used the Wetlands Trail from mid-October through April. Approximately 4,200 students used to use the trail each year for ranger-led programs (NPS 1996); however, programs are not planned for the Wetlands Trail in the near future.

Las Vegas Wash does not include swimming or other bodily-contact recreation with the wash as an identified beneficial use. Signs are posted near the wash advising the public that bodily contact with wash water is not recommended.

SECTION 4
ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This section presents the likely beneficial and adverse effects to the natural and human environment that would result from implementing the alternatives under consideration. This section describes short-term and long-term effects, direct and indirect effects, cumulative effects, and the potential for each alternative to impair park resources. Interpretation of impacts in terms of their duration, intensity (or magnitude), and context (local, regional, or national effects) are provided where possible.

4.2 METHODOLOGY

Impact analyses and conclusions are based on NPS staff knowledge of resources and the project area, review of existing literature, and information provided by experts in the NPS or other agencies. Any impacts described in this section are based on preliminary design of the alternatives under consideration. This analysis assumes that the mitigation and monitoring measures identified in Section 2.4 will be implemented for the applicable alternative (as specified in Section 2.4). Effects are quantified where possible; in the absence of quantitative data, best professional judgment prevailed.

4.2.1 Impact Terminology

Terms referring to impact intensity, context, and duration are used in the effects analysis. Unless otherwise stated, the standard definitions for these terms are as follows:

- *Negligible*: The impact is at the lower level of detection; there would be no measurable change.

- *Minor*: The impact is slight but detectable; there would be a small change.

- *Moderate*: The impact is readily apparent; there would be a measurable change that could result in a small but permanent change.

- *Major*: The impact is severe; there would be a highly noticeable, permanent measurable change.

- *Localized Impact*: The impact occurs in a specific site or area. When comparing changes to existing conditions, the impacts are detectable only in the localized area.

- *Short-Term Effect*: The effect occurs only during or immediately after implementation of the alternative.

- *Long-Term Effect*: The effect could occur for an extended period after implementation of the alternative. The effect could last several years or more and could be beneficial or adverse.

Significance thresholds are provided at the beginning of each resource discussion under the No Action Alternative. These thresholds are provided to help the reader and decisionmaker (the NPS) understand the magnitude and intensity of impacts.

4.2.2 Impairment

NPS Management Policies 2001 require the analysis of potential effects to determine if actions would impair park resources. Under the NPS Organic Act and the General Authorities Act, as amended, the NPS may not allow park resources and values to be impaired, except as authorized specifically by Congress. The NPS must always seek ways to avoid or minimize, to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the NPS management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment to the specific resources and values.

Impairment to park resources and values are analyzed in this section. Impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is key to the cultural or natural integrity of the park or that is a resource or value needed to fulfill a specific purpose identified in the enabling legislation. An impact would be less likely to constitute impairment if it is an unavoidable result that cannot be reasonably mitigated of an action necessary to preserve or restore the integrity of park resources or values.

4.2.3 Cumulative Effects

Cumulative effects are the direct and indirect effects of a proposed project alternative's incremental impacts when they are added to other past, present, and reasonably foreseeable actions, regardless of who carries out the action (40 CFR Part 1508.7). Guidance for implementing NEPA (Public Law 91-190, 1970) requires that federal agencies identify the temporal and geographic boundaries within which they will evaluate potential cumulative effects of an action and the specific past, present, and reasonably foreseeable projects that will be analyzed. For the purposes of this EA, the temporal boundary of analysis is from approximately 1985 to 2005. This boundary encompasses a range within which data are reasonably available and forecasts can be reasonably made. The geographic boundaries of analysis vary depending on the impact topic and potential effects. As such, they correspond to the analysis areas described under each impact topic.

Specific projects with the potential to cumulatively affect the resources (impact topics) evaluated for the project are identified in Table 4-1 below. These projects are further described in the narrative following the table. Some impact topics would be affected by several or all of the described activities, while others could be affected very little or not at all. How each alternative would incrementally contribute to potential impacts for a resource is included in the cumulative effects discussion for each impact topic.

Table 4-1
Past, Present, and Reasonably Foreseeable Activities Considered in the Cumulative Effects Analysis

CUMULATIVE ACTION	PAST	PRESENT	FUTURE
Population growth and urban development in Las Vegas Valley	X	X	X
Other grade-control structures in Las Vegas Wash	X	X	X
Nature preserve in Clark County Wetlands Park	X		
Floating wetlands in Lake Mead	X		
Las Vegas Wash tree planting project	X		

Sources: LVWCC 2001d.

The Las Vegas Valley was developed in conjunction with the railroads in the early 1900s. After that, the establishment of legalized gambling in 1910, construction of the Hoover Dam in 1935, and World War II continued to promote urban growth. During the 1930s Las Vegas was a small railroad town with a population of just over 5,000. Wastewater treatment facilities were built in the 1950s (LVWCC 2001e). By 1960, Las Vegas's population was over 64,000 (Clark County's was 127,000), and by 1980 it was approximately 164,000 (Clark County's was 463,000). Starting in the mid-1980s, annual population increases averaging nearly seven percent caused Las Vegas's population to almost double between 1985 and 1995, increasing from about 186,000 to 368,000, a 97.6 percent increase. At the same time, Clark County's population increased from 562,000 to 1,036,000, an increase of 84.3 percent (Las Vegas City 2001a). The July 2000 population estimate for Las Vegas was 482,874 (Las Vegas City 2001b). The latest population prediction in the Las Vegas Valley is for two million people by 2005 (Las Vegas City 2001a). In conjunction with this expected population increase, flows in Las Vegas Wash are predicted to increase by approximately 56 percent over existing flows by 2027 (LVWCC 2001e).

Section 1.6 of this document describes the other grade-control structures in Las Vegas Wash, the nature preserve in the Clark County Wetlands Park, the floating wetlands in Lake Mead, and the Las Vegas Wash tree planting project.

4.3 ALTERNATIVE A (NO ACTION)

4.3.1 Public Safety

A significant impact to public safety could result if an alternative were to result in increased exposure of people to hazards or were to increase the probability of a release of hazardous or toxic substances to the environment. The primary regulations for public safety relevant to this EA include FHWA guidelines for bridge safety and NPS guidelines for visitor safety.

Direct and Indirect Effects

Under the No Action Alternative, the trend of the canyon floor degrading and widening would continue unchecked. As a result, more material would be removed from the canyon walls, and they would continue to retreat. This would present a threat to both bridge abutments. A 100-year flood could achieve more than 6 meters (20 feet) of local scour at the piers. More degradation in the future, combined with local scour, could put the piers at risk. The bridge could wash out and collapse, which could lead to accidents, injuries, or fatalities. Significant impacts to safety are possible under the No Action Alternative if the bridge were to collapse while people were using it.

Cumulative Effects

The cumulative effects analysis area for safety is limited to the Northshore Road Bridge and the Wetlands Trail. The primary cumulative action affecting safety includes the growth of the Las Vegas Valley. Considering the No Action Alternative with the projected growth, urban development, and associated increases in Las Vegas Wash flows that further degrade the channel and threaten the bridge, the safety of the Northshore Road Bridge would be increasingly jeopardized over time and would almost certainly fail and collapse.

Conclusions

If the Northshore Road Bridge were to collapse because no action was taken, then this alternative would result in major adverse, long-term, localized impacts to safety and would impair the safety of the Northshore Road Bridge.

4.3.2 Natural Resources

Geology, Topography, and Soils

There could be significant impacts to geology, topography, and soils if an alternative were to expose people to an increased level of geologic hazards, such as slope instability, or if it were to result in a change in the availability of a geologic resource, such as soils. Soil contamination also would constitute a significant impact.

Direct and Indirect Effects. No changes to geologic processes would be expected under this alternative. Because continued erosion would further degrade and widen the wash bottom, more material would be removed from the canyon walls and they would continue to retreat. In areas where there are tension cracks on top of the canyon wall, the stream-side portion of the wall would either topple or slump into the wash channel.

This erosion and toppling/slumping would further alter local topography. Erosion could progress upstream of the bridge and affect the wash channel closer to the Lake Las Vegas dam, thereby threatening the integrity of the dam. Overall, no significant impacts are anticipated under the No Action Alternative.

Cumulative Effects. The cumulative effects analysis area for geology, topography, and soils is limited to the project area. The primary cumulative action affecting geology, topography, and soils includes growth in the Las Vegas Valley. Increased wash flows associated with valley growth would contribute to the degradation of the project area wash channel, which would occur under the No Action Alternative.

Conclusions. Implementing the No Action Alternative would result in moderate adverse, long-term, localized impacts to topography and soils. Collapse of canyon walls and associated bridge failure would impair topography.

Water Resources

There could be a significant water resources impact if an alternative were to result in a reduction of water quantity or water quality, if it were to cause a demand for water in excess of system capacity, if it were to result in substantial flooding, or if it were to expose people to existing flood hazards. The Clean Water Act, EO 11988 (Floodplain Management), and EO 11990 (Wetland Protection) are the primary regulations for water resources relevant to this EA. Also, the state of Nevada regulates construction activities in waterbodies as well as stormwater runoff from construction activities.

Direct and Indirect Effects. As the outflow for treated wastewater, urban runoff, shallow groundwater, and stormwater from the growing Las Vegas Valley, Las Vegas Wash flows are predicted to increase as additional water delivery systems and water rights are acquired. Average base flows are estimated to reach approximately 1,041 million liters per (275 million gallons per day) by 2027 (LVWCC 2001e), a 56 percent increase over existing flows. The projected base flow for the ultimate development of the Las Vegas Valley is 8.78 cubic meters per second (310 cubic feet per second) (Ayres Associates 2001). Based on this projected base flow, future wash flows during various flood recurrence intervals were estimated upstream of Lake Las Vegas and at the Northshore Road Bridge and are summarized in Table 4-2.

Table 4-2
Estimated Future Flood Flows in Las Vegas Wash

FLOOD RECURRENCE INTERVAL	UPSTREAM OF LAKE LAS VEGAS IN M^3/S (FT^3/S)	AT NORTHSHORE ROAD BRIDGE IN M^3/S (FT^3/S)
2 years	17.0 (600.3)	17.0 (600.3)
5 years	48.1 (1,698.6)	48.5 (1,712.8)
10 years	93.8 (3,312.5)	64.1 (2,263.7)
25 years	184.1 (6,501.4)	111.4 (3,934.0)
50 years	232.9 (8,224.7)	180.2 (6,363.7)
100 years	359.6 (12,699.1)	270.6 (9,556.1)
500 years	750.4 (26,500.0)	630.4 (22,262.2)

m^3/s = cubic meters per second; ft^3/s = cubic feet per second
Source: Ayres Associates 2001.

Both the base flows and flood flows would cause continued and increased erosion of the wash channel, both in and upstream of the project area, which would result in increased in-stream sediment and turbidity levels in the wash, and in Las Vegas Bay of Lake Mead. The toppling or slumping of portions of the canyon walls into the wash channel also would contribute substantial sediment to the wash and would further degrade water quality. As a result, water quality in the wash and Las Vegas Bay would likely decline.

The existing bypass conduits underneath Lake Las Vegas are designed to accommodate low flows (32.8 cubic meters per second [1,158 cubic feet per second]) in Las Vegas Wash. The conduits would be expected to handle the anticipated 56 percent increase in average base flows in the wash. However, when moderately to extremely high discharge rates occur in the wash, such as those expected during a flood, the bypass conduits would not handle wash volumes. As a result, substantial amounts of wash water would not be passed through the bypass structure and would reach the lake, and a substantial portion of the sediment load would be deposited upstream of the lake (Ayres Associates 2001).

No activities would occur in the 100-year floodplain, although the floodplain would continue to degrade and widen as the wash channel erodes. Specifically, the inset floodplain on one bank of the wash downstream of the bridge would widen because it is geotechnically less stable and more susceptible to erosion than the high terrace that is the floodplain on the opposite bank. The No Action Alternative would, over time, also lead to the erosion of the inset floodplain upstream of the bridge because the sediments that make up the inset floodplain are unconsolidated sand and gravel and are highly susceptible to erosion (Ayres Associates 2001).

Further deepening of the wash channel in the project area and downstream could eventually drain some project area fringe wetlands.

No significant impacts to water resources are anticipated under the No Action Alternative. However, as the wash floodplain continues to degrade, inconsistencies with EO 11988 (Floodplain Management) are possible. A statement of findings (SOF) pertaining to this is included in Appendix B.

Cumulative Effects. The cumulative effects analysis area for water resources is limited to the Las Vegas Wash watershed that encompasses the Las Vegas Valley, including the project area and Las Vegas Bay of Lake Mead. The primary cumulative actions affecting water resources include growth of Las Vegas Valley, grade-control structures in the wash upstream, floating wetlands in Las Vegas Bay of Lake Mead, and tree planting along the Las Vegas Wash.

Flows in the Las Vegas Wash are expected to increase with growth of Las Vegas Valley. Growth of the Las Vegas Valley has resulted in, and will continue to result in, the conversion of land cover from undisturbed vegetated soil to unvegetated dirt, gravel, or paved surfaces. This type of change in land cover results in reduced infiltration rates and increased surface runoff generation. These hydrologic changes have the potential to cause increased erosion and sediment delivery to Las Vegas Wash. Rooting of the trees planted along Las Vegas Wash upstream of the project area likely has a beneficial effect on the wash because roots help stabilize soil and reduce sediment runoff.

While implementing grade-control structures upstream of the project area would likely improve water quality downstream of those sites, continued erosion of the project area wash (under the No Action Alternative) would cause a decline in project area and downstream water quality and could negate any water quality improvements upstream. The floating wetlands in Las Vegas Bay would improve water quality some but would have little effect outside of the localized area.

Conclusions. Implementing the No Action Alternative would result in minor and potentially moderate adverse, long-term, impacts to water resources in the project area and downstream (i.e., Las Vegas Bay). No impairment is anticipated.

Vegetation

There could be significant impacts to the vegetation if an alternative were to contribute to the introduction or spread of nonnative invasive species or federally listed noxious weeds or if the alternative were to promote the introduction, growth, or expansion of the range of these species. The primary regulations for vegetation relevant to this EA include EO 13112 (Invasive Species) and NPS guidelines.

Direct and Indirect Effects. The No Action Alternative would not affect project area vegetation. It would not contribute to the introduction or spread of nonnative invasive species or federally listed noxious weeds, nor would it promote the introduction, growth, or expansion of the range of these species. However, if the bridge were to fail and resulted in flooding of the streambanks, riparian vegetation could be adversely affected. Further damage to vegetation would occur during in-stream construction activities to cleanup bridge debris and replace the bridge. However, such potential effects would not have significant impacts to vegetation.

Cumulative Effects. The cumulative effects analysis area for vegetation is limited to the project area. No cumulative actions are likely to affect project area vegetation.

Conclusions. Implementing the No Action Alternative would not affect vegetation. However, if the bridge were to fail and collapse, there would be moderate adverse, short-term (and possibly long-term), localized impacts to vegetation. There would not be impairment.

Wildlife and Aquatic Life

There could be significant impacts to wildlife and aquatic life if an alternative were to result in the loss of a substantial number of individuals of any species beyond normal variability. The primary regulation for wildlife and aquatic life relevant to this EA includes the Fish and Wildlife Coordination Act.

Direct and Indirect Effects. The No Action Alternative would result in degradation of wash channel and Las Vegas Bay water quality, which would directly affect aquatic life and would indirectly affect wildlife dependent on these water resources. The No Action Alternative would not directly affect project area wildlife in the short term. However, a substantial delay in addressing the Las Vegas Wash degradation issue could result in severe damage to the wash and bridge (e.g., bridge collapse). If this occurred, large-scale construction activities to address the damage (e.g., bridge replacement) would be required. Such activities would result in extensive disturbance to wildlife and aquatic life because the construction area would be large and the construction period would be long. However, no significant impacts to wildlife and aquatic life are anticipated.

Cumulative Effects. The cumulative effects analysis area for wildlife and aquatic life is limited to the Las Vegas Wash watershed and the Las Vegas Bay area and, for some wide-ranging species such as migratory birds, could extend into other regions.

Development degrades wash water quality that, when combined with continued wash degradation under the No Action Alternative, could adversely affect aquatic life. Water quality related to implementing grade-control structures upstream of the project area is discussed in Water Resources above. In addition, as the wash continues to degrade, the overall loss of wetlands associated with the entire wash could result in less available habitat for some wildlife species.

Beneficial cumulative effects to wildlife include the nature preserve, floating wetlands, and newly planted trees, all of which provide additional wildlife habitat and likely increase biodiversity.

Conclusions. Implementing the No Action Alternative would result in minor adverse, long-term impacts to aquatic life. It would not affect wildlife in the short term, but it could result in moderate to major adverse impacts to wildlife and aquatic life if the bridge were to fail. Wildlife and aquatic life would not be impaired under the No Action Alternative.

Special Status Species

There could be significant impacts to special status species if an alternative were to result in the disruption or removal of any endangered or threatened species or its habitat, migration corridors, or breeding areas; if it were to result in the loss of a substantial number of individuals of any species beyond normal variability; or if it were to result in a measurable degradation of sensitive habitats. The primary regulations pertinent for special status species include the Endangered Species Act, Migratory Bird Act, and Fish and Wildlife Coordination Act.

Direct and Indirect Effects. Effects to special status species under the No Action Alternative would be similar to those described above for wildlife and aquatic life. The overall continued degradation of water quality in Las Vegas Bay of Lake Mead could adversely affect razorback sucker. There would be no significant impacts to special status species under the No Action Alternative because it would not result in inconsistencies with the above-referenced regulations.

Cumulative Effects. Cumulative effects to special status species would be similar to those described above for wildlife and aquatic life. As the wash continues to degrade, the overall loss of wetlands associated with the entire wash could result in less available habitat for species such as the willow flycatcher and the Yuma clapper rail.

Conclusions. Implementing the No Action Alternative would result in negligible adverse, long-term impacts to the razorback sucker because of decreased water quality in Lake Mead but would not result in impairment.

Air Quality

There could be significant impacts to air quality if an alternative were to result in substantially higher air pollutant emissions or were to cause or contribute to violations of federal or state ambient air quality standards. The primary regulation for air quality relevant to this EA includes the Clean Air Act. Additionally, the Clark County Health District issues dust-control permits for construction activities.

Direct and Indirect Effects. There would be no effects to air quality under the No Action Alternative.

Cumulative Effects. The cumulative effects analysis area for air quality is limited to the project area and bordering NRA locations. The primary cumulative action affecting air quality includes the growth of Las Vegas Valley. The No Action Alternative would not contribute to cumulative effects; however, growth in the Las Vegas Valley would likely degrade air quality in the valley, in the project area, and in bordering NRA locations.

Conclusions. Implementing the No Action Alternative would not result in any impacts to air quality, nor would air quality be impaired.

4.3.3 Noise

There could be significant noise impacts if an alternative were to expose noise-sensitive receptors to excessive noise levels, if it were to generate substantial new sources of noise, or if it were to introduce new noise-sensitive receptors to areas with existing high levels of noise. Noise emissions are regulated by NPS Director's Order 47, Soundscape. Emissions may also be regulated by local laws and regulations. No such regulations are in place in the project area.

Direct and Indirect Effects

The No Action Alternative would not affect existing noise levels in the project area.

Cumulative Effects

The cumulative effects analysis area for noise is limited to the project area. There are no cumulative actions within this analysis area; therefore, no cumulative effects to noise are anticipated.

Conclusions

Implementing the No Action Alternative would not affect noise levels or impair park resources.

4.3.4 Cultural Resources

For the purposes of this analysis, significant cultural resources are those properties listed in or eligible for inclusion in the National Register of Historic Places (NRHP). An adverse effect is defined as any action that would diminish the integrity of a historic property's location, setting, design, materials, workmanship, feeling, or association. The primary regulations for cultural resources relevant to this EA include the NHPA, EO 13175 (Consultation and Coordination with Indian Tribal Governments), and EO 13007 (Indian Sacred Sites).

Direct and Indirect Effects

The No Action Alternative would not affect any known cultural resources.

Cumulative Effects

The cumulative effects analysis area for cultural resources includes the full length of the wash channel between its origin and Las Vegas Bay of Lake Mead. The primary cumulative actions affecting cultural resources include the growth of Las Vegas Valley and the installation of other grade-control structures in the wash. Other grade-control structures would slow further alteration of the wash's historic and current appearance and configuration. However, taking no action and valley development would cumulatively result in additional alteration of the wash's appearance and configuration.

Conclusions

Implementing the No Action Alternative would not result in any effects or impairment to any known cultural resources..

4.3.5 Visual Resources

There could be significant impacts to visual resources if an alternative were to substantially reduce the scenic quality of an area as seen from a viewpoint with high viewer sensitivity. The primary regulation for visual resources relevant to this EA includes NPS guidelines.

Direct and Indirect Effects

The No Action Alternative would have no effect on visual resources in the project area. However, should the Northshore Road Bridge fail in the future, the existing landscape character would be affected, at least temporarily, while the bridge is being rehabilitated, and possibly permanently if bridge debris remains in the Las Vegas Wash. No significant impacts are anticipated.

Cumulative Effects

The cumulative effects analysis area for visual resources is limited to within 1.6 kilometers (1.0 mile) of Northshore Road in the project area. No cumulative actions are within this analysis area; therefore, no cumulative effects to visual resources are anticipated.

Conclusions

Implementing the No Action Alternative would not affect visual resources. However, if the bridge were to fail and collapse, there would be moderate to major short-term (and possibly long-term) adverse, localized impacts. Impairment is not anticipated unless the bridge were to collapse, in which case impairment would be possible.

4.3.6 Visitor Use and Experience

There could be significant impacts to visitor use and experience if an alternative were to substantially decrease the availability of recreational opportunities or if it were to substantially degrade the quality of the recreational experiences in a region. The primary regulation for visitor use and experience relevant to this EA includes NPS guidelines.

Direct and Indirect Effects

There could be further channel degradation under the No Action Alternative in the collapse of the Northshore Road Bridge, which would require closing Northshore Road. This would inconvenience NRA users needing a north-south connection by requiring them to exit the NRA, drive to another north-south connection in eastern Las Vegas, then reenter the NRA, a detour of over 30 miles.

Further deepening the wash channel in the project area and downstream would result in fewer access points to the wash because of its steep and unstable terrain. Altering the wash channel also could make the Wetlands Trail impassable. Either situation would result in closing the Wetlands Trail. Opportunities for viewing wildlife and plant species in the vicinity of the trail would be lost if the trail were closed.

In summary, significant impacts are not anticipated because the above impacts would not be considered substantial in the region.

Cumulative Effects

The cumulative effects analysis area for visitor use and experience is the entire Lake Mead NRA. The primary cumulative actions affecting visitor use and experience include the growth of the Las Vegas Valley and floating wetlands in Lake Mead. Population growth in the Las Vegas Valley would result in increased visitation to the NRA. Floating wetlands in Lake Mead could attract additional visitors to the Las Vegas Bay area of the NRA.

Conclusions

Implementing the No Action Alternative would result in minor adverse, long-term, localized impacts but would not impair visitor use and experience.

4.4 ALTERNATIVE B (PREFERRED)

4.4.1 Public Safety

Direct and Indirect Effects

The wash stabilization measures proposed under Alternative B would slow the trend of the canyon floor degrading and widening, would slow the retreat of the canyon walls, would control the streambed elevation at the bridge, and would reduce the threat to the piers and bridge abutments. The potential of bridge collapse would be substantially reduced, thereby maintaining visitor safety, and the Northshore Road would remain open. In summary, Alternative B would not result in significant impacts to public safety.

Cumulative Effects

The cumulative effects analysis area and cumulative actions affecting safety that are described under the No Action Alternative are the same for Alternative B. Considering Alternative B with the projected growth, urban development, and associated increases in Las Vegas Wash flows, which would be accommodated by the proposed grade-control structures, the safety of the Northshore Road Bridge would be maintained.

Conclusions

Implementing Alternative B would result in major beneficial, long-term, localized effects to safety. There would be no impairment.

4.4.2 Natural Resources

Geology, Topography, and Soils

Direct and Indirect Effects. No changes to geologic processes or topography are expected under this alternative. Constructing grade-control structures would slow the flow of water in the wash, thus reducing bank erosion, and would stabilize the channel and reduce channel widening.

Estimated quantities of excavation in the wash necessary for installing the three grade-control structures are summarized in Table 4-3. These estimates are based on a preliminary design of the structures and could be modified during the final design or as a result of site conditions encountered during actual construction.

Table 4-3
Estimated Excavation Requirements for Alternative B

ELEMENT	EXCAVATION (CUBIC METERS)	EXCAVATION (CUBIC FEET)
Grade-control Structure 1 (upstream-most structure)	27,700	978,210
Grade-control Structure 2 (middle structure)	14,700	519,123
Grade-control Structure 3 (downstream-most structure)	28,800	1,017,057
Toe protection	20,700	731,010
Tributary stabilization	1,000	35,314
Total	**92,900**	**3,280,715**

Source: Ayres Associates 2001.

To make the existing and previously used access route suitable for use during construction of Alternative B, the route would be widened from its 2.4-meter- (8.0-foot-) width to a width of approximately 4.9 meters (16.0 feet). In addition, the portion of the route within Las Vegas Wash that has been washed out would be reconstructed, and up to four turnouts would be provided. All fill necessary for access route reconstruction would be obtained on-site and would be stockpiled adjacent to the Las Vegas Wash. New access route construction is estimated to disturb less than 0.8 hectare (2.0 acres). Heavy equipment using the access route would compact the soil.

In summary, there would be no significant impacts to geology, topography, or soils under Alternative B.

Cumulative Effects. The cumulative effects analysis area and cumulative actions affecting geology, topography, and soils that are described under the No Action Alternative are the same for Alternative B. Increased wash flows associated with valley growth would be accommodated by the proposed grade-control structures, and further degradation of the wash channel in the project area would be slowed.

Conclusions. Implementing Alternative B would result in minor adverse, long-term, localized impacts to soils as a result of constructing grade-control structures in the wash. These adverse impacts would be outweighed by the major beneficial, long-term, localized effects to soils and topography that would occur because the streambed and banks would be stabilized. The net result would be moderate beneficial, long-term, localized effects. Resources would not be impaired.

Water Resources

Direct and Indirect Effects. The grade-control structures would slow wash water, thus decreasing soil erosion and the amount of sediment flowing into Lake Mead. There would be minor long-term benefits to water quality. During construction activities in the wash channel there would be minor short-term increases of in-stream sediment and turbidity levels immediately downstream of grade-control structure locations. Depending on final design of the grade-control structures installed under Alternative B, meandering of the water course could be created to enhance the area hydrologically and aesthetically.

The grade-control structures that would be implemented under this alternative would be within the 100-year floodplain and, as wash stabilization measures, would likely result in the preservation of the natural and beneficial values served by the floodplain.

Section 2.5 identifies the requirement to adhere to Section 404 of the Clean Water Act for dredge and fill activities in waters of the US. Fringe wetlands would be temporarily impacted by construction equipment. A generous estimate of fringe wetlands that could be affected by construction equipment under a worst-case scenario would include the entire shoreline in the project area. This linear distance (between the toe protection upstream of the bridge and the downstream-most grade-control structure) is anticipated to be approximately 1,000 meters (3,281 feet). The width of fringe wetlands varies. Areas of short-term disturbance would be revegetated, per the measures outlined in Section 2.4.2.

Long-term impacts to fringe wetlands would occur where the edges of the grade-control structures meet the shoreline. The total area, both in-stream and on the shoreline, that would be required for installing structures under Alternative B is approximately 0.7 hectare (1.7 acres). It is estimated that approximately one-fourth of this area, or 0.2 hectare (0.4 acre), could impact fringe wetlands. As detailed in Section 2.4.2, new wetlands will be created by planting approximately 4 hectares (10 acres) of emergent and riparian vegetation. This mitigation would offset any impacts to existing fringe wetlands.

In summary, there would be no significant impacts to water resources. A SOF pertaining to floodplains and wetlands is included in Appendix B.

Cumulative Effects. The cumulative effects analysis area and cumulative actions affecting water resources that are described under the No Action Alternative are the same for Alternative B. Water quality in the wash and in Las Vegas Bay would be cumulatively improved because of the following: increased erosion and sediment delivery to the wash because of valley development, reduced sediment runoff to the wash because of newly planted riparian trees, improved water quality because of grade-control structures upstream of the project area and the three proposed grade-control structures under Alternative B, and improved localized water quality near the floating wetlands in Las Vegas Bay.

Conclusions. Implementing Alternative B would result in moderate beneficial, long-term effects to water quality and floodplains in the project area and downstream. It would result in minor adverse, long-term impacts to fringe wetlands. However, wetlands mitigation would offset these impacts, and the net result of Alternative B would be moderate beneficial, long-term effects to wetlands. Water resources would not be impaired.

Vegetation

Direct and Indirect Effects. Access route reconstruction would disturb less than 0.8 hectare (2.0 acres) of soil, sparse amounts of which are currently vegetated. Vegetation that could be trampled or destroyed would include primarily creosote and catclaw (NPS 1997), which are common in the surrounding area. The access route would be narrowed back to its current width of 2.4 meters (8.0 feet) following construction, and the currently vegetated areas would be revegetated with native species. As such, there would be no net losses to vegetation resulting from the access route.

Alternative B also would require removing riparian vegetation, primarily nonnative tamarisk, to access the wash. In-stream construction also would affect vegetation. The distance between the toe protection upstream of the bridge and the downstream-most grade-control structure is anticipated to be approximately 1,000 meters (3,281 feet). The channel width varies between roughly 30 and 60 meters (98 and 197 feet). A generous estimate of the total in-stream area that could be affected by construction equipment under a worst-case scenario, therefore, is about 6 hectares (15 acres). Although in-stream vegetation is sparse, for the purposes of the worst-case scenario, approximately one-third of this area, or 2.0 hectares (4.9 acres), are estimated to contain vegetation that could be affected during construction. Species that would be affected include tamarisk, cattail, and salt grass. Areas of short-term disturbance would be revegetated, per the measures outlined in Section 2.4.2. Removing tamarisk would be beneficial to the project area vegetation.

Long-term impacts to in-stream vegetation would be considerably less than the above short-term impacts and would occur where actual structures and toe protection would be located. The total area required for installing structures under Alternative B is approximately 0.7 hectare (1.7 acres). Since approximately one-third of this area is estimated to contain vegetation, approximately 0.2 hectare (0.4 acre) of vegetation would be permanently removed. Primarily tamarisk, cattail, and salt grass would be affected.

Beyond the necessary removal of nonnative tamarisk during construction, additional acreage of tamarisk would be removed during the project. This tamarisk removal, combined with revegetation with native species (Section 2.4.2), would lead to increased biodiversity and would have beneficial effects on project area vegetation. Because Alternative B would slow wash flows, it would likely result in the creation of a more consistent riparian zone, as well as in improved riparian vegetation.

With implementation of the mitigation and monitoring measures outlined in Section 2.4.2, Alternative B would not contribute to the introduction or spread of nonnative invasive species or federally listed noxious weeds, nor would it promote the introduction, growth, or expansion of the range of these species. As such, there would be no significant impacts to vegetation.

Cumulative Effects. The cumulative effects analysis area for vegetation is limited to the project area. No other actions are likely to affect project area vegetation; therefore, cumulative effects are the same as those for the impacts identified above for Alternative B.

Conclusions. Implementing Alternative B would result in minor beneficial, long-term, effects to vegetation. There would be no impairment.

Wildlife and Aquatic Life

Direct and Indirect Effects. Construction activities would temporarily disturb project area wildlife, which could be displaced to adjacent habitats. Revegetating riparian areas with native species, as well as removing some nonnative tamarisk, would increase plant structure and diversity. This riparian area would provide protective cover to native species from nearby disturbances and would supply forage material and nest sites for songbirds. Stabilizing substrate within the wash would reduce opportunities for shrubs to be uprooted during flooding. As such, the project area's relative value to wildlife would increase following implementation of Alternative B. Implementing Alternative B would reduce the chances of a substantially larger bridge/wash rehabilitation project being required in the future, which would have a greater impact on wildlife and aquatic life.

Construction-related increases of in-stream sediment and turbidity levels immediately downstream of grade-control structure excavation sites would have minor adverse impacts to aquatic life. The minor long-term benefits to water quality (described in the Water Quality section for Alternative B above) also would benefit aquatic life.

In summary, no significant impacts to wildlife and aquatic life are anticipated under Alternative B.

Cumulative Effects. The cumulative effects analysis area and cumulative actions affecting wildlife and aquatic life that are described under the No Action Alternative are the same as those for Alternative B. Adverse impacts to area wildlife from valley growth and development are discussed in the Wildlife and Aquatic Life portion of Section 4.4.2. That section also includes a discussion of other cumulative actions' beneficial effects to wildlife from increased wildlife habitat and biodiversity. Alternative B's improved riparian area could provide habitat for species displaced from valley areas under development.

Conclusions. Implementing Alternative B would result in minor adverse, short-term impacts to wildlife and aquatic life. Minor—and potentially moderate—beneficial long-term effects to wildlife and aquatic life would be realized. There would be no impairment under this alternative.

Special Status Species

Direct and Indirect Effects. Effects to special status species under Alternative B would be similar to those described above for wildlife and aquatic life. The southwestern willow flycatcher, desert tortoise, and razorback sucker are the federally listed special status species that could be affected under Alternative B. Based on the likelihood of the species occupying the project area, on the project design, and on the mitigation measures described in Section 2.4.2, impacts to these species would not occur.

The southwestern willow flycatcher and desert tortoise are not likely to occur in the project area, and surveys for desert tortoise in June 2001 found no presence or sign of the species. Additional survey requirements for desert tortoise prior to construction in any given area, survey requirements for southwestern willow flycatcher, and mitigation measures for both species (described in Section 2.4.2) will insure that Alternative B does not affect the species should they be discovered during surveys.

Implementing Alternative B would not affect razorback sucker since they are endemic to the Colorado River system and would not be adversely impacted by temporarily increased water turbidity from construction activities.

Beneficial effects to special status species would be similar to those described above for wildlife and aquatic life. In summary, no significant impacts to special status species are anticipated under Alternative B.

Cumulative Effects. Cumulative effects to special status species would be similar to those described above for wildlife and aquatic life.

Conclusions. Implementing Alternative B would not result in any long-term impacts to special status species Impairment would not occur.

Air Quality

Direct and Indirect Effects. Heavy equipment and trucks using the area during construction and restoration would cause short-term localized increases in dust and exhaust emissions. Such impacts would occur in the immediate vicinity of the project area. Short-term, localized impacts caused by haul trucks traveling to and from the project area also could be detectable along roadways (e.g., Northshore Road) leading to and from the project area. The measures described in Section 2.4.2 would mitigate impacts to air quality. There would be no significant impacts.

Cumulative Effects. The cumulative effects analysis area and cumulative actions affecting air quality that are described under the No Action Alternative are the same for Alternative B. Air quality in the project area and in bordering NRA locations would be poorest during short periods (e.g., one day to two weeks) when air quality in the valley is particularly poor (e.g., during a winter inversion), and while project construction is underway. However, even during these periods, air quality would be only slightly degraded.

Conclusions. Implementing Alternative B would not impact air quality. Air quality would not be impaired.

4.4.3 Noise

Direct and Indirect Effects

Construction activities would increase noise levels within the project area and along the routes used for hauling equipment and materials. However, these increases would be temporary, and there would be no significant impacts.

Cumulative Effects

The cumulative effects analysis area for noise is limited to the project area. Because there are no cumulative actions within this analysis area and because impacts associated with Alternative B would be temporary, no cumulative effects are anticipated.

Conclusions

Implementing Alternative B would result in moderate adverse, short-term impacts to project area noise. There would be no impairment to park resources.

4.4.4 Cultural Resources

Direct and Indirect Effects

The APE has been inventoried for cultural resources. No cultural resources have been identified in the project area. Substantial amounts of Las Vegas Wash alluvium were removed during the 1976 floods, which eliminated the potential for intact, significant cultural resources on the ground surface. The potential for buried, intact archaeological deposits in the wash is extremely remote. Access route reconstruction could affect undiscovered, buried archaeological deposits, although the potential for such resources is very low because the access route was disturbed and used during a previous project.

Impacts to cultural resources are not anticipated under Alternative B. Native American groups have been consulted. The NPS filed compliance documentation with the Nevada SHPO as required by the NHPA.

Cumulative Effects

The cumulative effects analysis area and cumulative actions affecting cultural resources that are described under the No Action Alternative are the same for Alternative B. Wash stabilization associated with Alternative B and with other grade-control structures in the wash would cumulatively slow further alteration of the wash's appearance and configuration. This would offset somewhat any alteration of the wash resulting from valley development.

Conclusions

Implementing Alternative B would not affect or impair any known cultural resources.

4.4.5 Visual Resources

Direct and Indirect Effects

Short-term impacts to visual resources in the project area would occur during construction of Alternative B. Long-term effects would not occur since the proposed stabilization features would match the color of the natural substrate in the project area. This would help them visually blend in with the surrounding natural rocks and soils. No significant impacts to visual resources would occur under Alternative B.

Cumulative Effects

For the reasons described under the No Action Alternative, no cumulative effects to visual resources are anticipated.

Conclusions

Implementing Alternative B would have moderate adverse, short-term, localized impacts on visual resources in the project area. Minor long-term benefits to visual resources could occur as a result of slowing wash flows and making the wash appear more like a wetland environment than a fast-flowing stream. Impairment would not occur.

4.4.6 Visitor Use and Experience

Direct and Indirect Effects

Temporary road closures necessary for construction activities would prevent visitors from accessing facilities on either side of the wash during construction. These closures are anticipated to be temporary and would be conducted on weekdays, if practicable, when visitation is lower. Visitor use of the construction access route would be restricted during the construction period. Location of the access route within the wash adjacent to Las Vegas Wash would detract from the natural experience visitors expect at the NRA.

Implementing grade-control structures under Alternative B would maintain the long-term integrity and function of the Northshore Road Bridge, thus maintaining visitors' access across Las Vegas Wash. Slowing wash channel deepening and widening would maintain access points to the wash and the Wetlands Trail. Preserving access to and use of the Wetlands Trail would allow visitors continued recreational and educational opportunities associated with wildlife- and plant-viewing opportunities. As biodiversity increases in the area, these opportunities would increase. Slowing wash flows could also invite swimming, so the NPS would post additional signs in the area with recommendations that body contact with wash water be avoided.

In summary, Alternative B would not result in significant impacts to visitor use and experience.

SECTION 5
CONSULTATION AND COORDINATION

Public notice of the availability of the EA was published in local newspapers and the Lake Mead NRA Internet Web site (http://www.nps.gov/lame). The EA was circulated to individuals, businesses, and organizations of the NRA's mailing list. Copies of the EA were made available at the Boulder City Public Library, the Henderson Public Library, and Lake Mead NRA Internet Web site (http://www.nps.gov/lame/pphtml/facts.html). A copy of the EA can be obtained by direct request to:

Ms. Nancy Hendricks, Resource Management Specialist
National Park Service
Lake Mead National Recreation Area
601 Nevada Highway
Boulder City, Nevada 89005
Telephone: (702) 293-8756
Facsimile: (702) 293-8008
Electronic Mail: Nancy_Hendricks@nps.gov

A 30-day public review period of the EA was provided.

Various federal and state resource agencies, Native American tribes, and members of the public also were consulted in the review of the EA, as listed in Table 5-1.

Table 5-1
Agencies and Individuals Consulted in Review of EA

NAME	AGENCY OR AFFILIATION	ADDRESS
Native American Tribes		
Alfreda Mitre, Chairperson	Las Vegas Paiute Tribe	Las Vegas, Nevada
Richard Arnold, Chairperson	Pahrump Paiute Tribe	Pahrump, Nevada
Alex Sheperd, Chairperson	Paiute Indian Tribe of Utah	Cedar City, Utah
Gloria Benson, Chairperson	Kaibab Paiute Tribe	Fredonia, Arizona
Cindy Osife, Liaison	Kaibab Paiute Tribe	Fredonia, Arizona
Roselyn Mike, Chairperson	Moapa Band of Paiutes	Moapa, Nevada
Merrill Wall, Chairperson	Shivwits Paiute Tribe	Santa Clara, Utah
Levi Esquerra, Chairperson	Chemehuevi Indian Tribe	Chemehuevi Valley, California
Betty Cornelius, Museum Director	Colorado River Indian Tribes	Parker, Arizona
Federal Agencies		
	US Department of the Interior, National Park Service, Western Archaeological and Conservation Center	Tucson, Arizona
	US Department of the Interior, Fish and Wildlife Service, Nevada State Office	Reno, Nevada
	US Army Corps of Engineers, Sacramento District, Nevada Office	Reno, Nevada
	Advisory Council on Historic Preservation	Washington, D.C.
State Agencies		
	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection	Carson City, Nevada
	Nevada Department of Conservation and Natural Resources, Division of Wildlife	Carson City, Nevada
	Nevada Division of Environmental Quality	Carson City, Nevada
	Nevada State Historic Preservation Office	Carson City, Nevada
	Nevada Department of Transportation, District 1	Las Vegas, Nevada
	Nevada Department of Administration, Nevada State Clearinghouse	Carson City, Nevada
	Governor of Nevada	Carson City, Nevada
	State of Nevada, Colorado River Commission	Las Vegas, Nevada

NAME	AGENCY OR AFFILIATION	ADDRESS
Local Agencies		
	Clark County Health District, Air Pollution Control Division	Las Vegas, Nevada
	City of Henderson	Henderson, Nevada
	City of Las Vegas	Las Vegas, Nevada
	Southern Nevada Water Authority	Las Vegas, Nevada
Other Contacts		
Vice President	Lake Las Vegas	Henderson, Nevada
Mr. Frank T. Beers III, PE		Las Vegas, Nevada

SECTION 6
LIST OF PREPARERS

Individuals from the NPS and FHWA and contractor personnel who were involved in the interdisciplinary preparation and review of EA are listed below.

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William Burke, Chief, Physical Resources
Dennis Cobb, Wildlife Biologist
Steve Daron, Archaeologist
Curt Deuser, Resource Management Specialist, Vegetation
Dale Melville, P.E., Civil Engineer
Rosie Pepito, Chief, Cultural Resources
Kent Turner, Chief, Resource Management
Jim Vanderford, Chief, Maintenance

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(Air Quality and Noise)

Randolph B. Varney
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SECTION 7
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APPENDIX A
DESERT TORTOISE MITIGATION AND MONITORING

This appendix supplements information provided in the Special Status Species portion of Section 2.4.2, and the information presented is intended to prevent or minimize impacts to desert tortoise (Clark County 1998; USFWS 1994; Desert Tortoise Council 1995).

Before the project begins, a qualified desert tortoise biologist will explain the following educational information to all forepersons, construction and maintenance personnel, and other employees working on the project:

§ Information on the occurrence of desert tortoise in the area;

§ General tortoise information, including its appearance and activity patterns;

§ Information on the life history of the desert tortoise;

§ Reporting requirements if desert tortoises are found;

§ The protection of the desert tortoise as a threatened species under the federal Endangered Species Act;

§ The definition of "take" ("to harass, harm, pursue, hunt, wound, kill, trap, capture, collect, or attempt to engage in any such conduct, including touching in any way");

§ The penalties for violating federal and state laws, including that the employee may be imprisoned for up to six months and fined up to $25,000 per incident for taking a tortoise; and

§ Measures to protect tortoises and personal measures employees can take to promote the conservation of desert tortoises.

- The following measures will be implemented to minimize adverse effects to the desert tortoise, including habitat loss, degradation, and fragmentation, direct mortality from construction activities, and raven predation:

- Construction will not commence until November 2001 (after desert tortoise active season of March 1 through October 31).

- The construction area, staging areas, and access route will be clearly marked, and construction fencing will be placed around the perimeter of the project area (leaving road access open) before construction starts. All activities, including equipment access, will be confined to these boundaries. No vehicular traffic, equipment, or parking will be allowed outside the fenced project area, designated staging areas, or existing graded roads. Disturbance to soils or vegetation outside the designated construction area will not be tolerated and are subject to fine by the NPS.

- Upland areas of the construction and staging areas will be surveyed for desert tortoise and their burrows just before construction starts in any given area. The intent of these surveys is to remove all tortoises on the project site and to identify burrows that will be avoided during construction. A qualified biologist will conduct all surveys, will handle any tortoises encountered, and will excavate any burrows, in accordance with USFWS-approved protocol (Desert Tortoise Council 1995).

- Tortoise burrows found within the project area will be avoided if possible. These burrows will be protected with tortoise-proof fencing intended to keep burrowing tortoises near the burrow. The fencing will be placed at a minimum of 6 meters (20 feet) from the burrow on sides bordered by construction to prevent underground portions of the burrow from being crushed. Fencing will remain in place until construction in the vicinity has been completed. The fencing will be placed, inspected, and removed under the direction of a qualified biologist.

- Tortoise burrows found within the project area that could not be avoided will be excavated by hand to determine if they were occupied and to remove any tortoises within them. All tortoises found within the project area, whether aboveground or in excavated burrows, will be placed 91 to 305 meters (300 to 1,000 feet) outside of the clearing limits, in the direction of undisturbed habitat. The tortoises will be handled and placed in accordance with procedures identified in consultation with the USFWS.

- During the tortoise active period, a tortoise biologist will be present during all construction activity when one or more pieces of heavy equipment are being used. This is to ensure that desert tortoises are not inadvertently harmed.

- If any tortoise is seen on or near the construction site, work will be stopped immediately and the project supervisors will be notified. Work will not resume until directed by the contracting representative or on-site monitor, in consultation with the Resource Management Division of Lake Mead NRA.

- Authorized personnel will remove any tortoise found on the site, in accordance with USFWS handling and placement protocol. Desert tortoises will be moved solely for the purpose of putting them out of harm's way.

- Desert tortoises moved from November 1 through February 28 or those in hibernation regardless of the date will be placed into burrows constructed according to the Desert Tortoise Council Guidelines (Desert Tortoise Council 1995).

- No vehicular traffic, equipment, or parking will be allowed off the fenced project area, designated staging areas, or existing graded roads. All construction-related traffic on the existing graded roads will be restricted to a speed limit of 24 kilometers (15 miles) per hour.

- The ground beneath any parked vehicles will be carefully searched for tortoises before the vehicles are moved to assure that there are no tortoises under them. If a tortoise is found beneath a vehicle, a qualified biologist will move it, according to protocols specified by the USFWS (Desert Tortoise Council 1995).

- A litter-control program will be implemented during construction and will be adhered to. Trash will be removed from the work site daily to approved receptacles. Littering or any disposal of waste products will not be tolerated and is subject to fine by the NPS.

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APPENDIX B
STATEMENT OF FINDINGS FOR FLOODPLAINS AND WETLANDS

STATEMENT OF FINDINGS FOR
EXECUTIVE ORDER 11988, "FLOODPLAIN MANAGEMENT"
AND
EXECUTIVE ORDER 11990, "PROTECTION OF WETLANDS"

Environmental Assessment for the Las Vegas Wash Stabilization Project

RECOMMENDED:

Superintendent, Lake Mead National Recreation Area — Date

CONCURRED:

Chief, Water Resources Division — Date

CONCURRED:

Chief, Pacific West Regional Compliance Officer — Date

APPROVED:

John Reynolds, Pacific West Regional Director — Date

PURPOSE OF AND NEED FOR ACTION

The NPS has prepared and made available for public review an environmental assessment (EA) to evaluate a proposal to place three grade-control structures at intervals downstream of the Northshore Road Bridge, within Las Vegas Wash, at Lake Mead National Recreation Area (NRA) to protect the Northshore Bridge from erosion. Lake Mead NRA is in southeastern Nevada and northwestern Arizona and encompasses lands around Lake Mead and Lake Mohave (Figure 1-1 of the EA). Since the construction of Northshore Road Bridge in 1978, the ever-increasing amount of runoff in Las Vegas Wash has caused the wash channel to cut ever deeper into the landscape and has caused the wash channel to grow wider, threatening the stability of the bridge. Without the NPS taking action, the bridge could eventually fail.

The primary purpose of this project is to enhance safety for users of the Northshore Road Bridge by improving its stability and longevity while protecting natural and cultural resources. An additional purpose of the project is to reduce erosion in the Las Vegas Wash such that water quality is enhanced in the project area and downstream. The proposal is needed because the Northshore Road Bridge is designated by the Federal Highway Administration (FHWA) as scour critical and, as such, poses a threat to safety. “Scour critical” indicates that the pier foundations are unstable for calculated scour conditions. The FHWA listed the bridge as scour critical after noticing during their inspection of the bridge and wash in 1999 that the channel had been down-cut (i.e., deepened) and widened (FHWA 1999). As the wash channel deepens and widens, the bridge could be undermined and could collapse into the wash (Ayres Associates 2001). Given that vehicles on this portion of Northshore Road routinely travel at approximately 80 kilometers (50 miles) per hour, such a catastrophic failure of the bridge could result in loss of human life.

This document is prepared in accordance with Executive Order 11988 (Floodplain Management), Executive Order 11990 (Protection of Wetlands), and National Park Service (NPS) policies and procedures that can be found in the Floodplain Management Guidelines (Special Directive 93-4), in Director’s Order 77-1 (Wetland Protection), and in Procedural Manual 77-1 (Wetland Protection).

The policies and procedures related to wetlands emphasize: exploring all practical alternatives to building on, or otherwise affecting, wetlands; reducing impacts to wetlands whenever possible; and providing direct compensation for any unavoidable wetland impact by restoring degraded or destroyed wetlands on other NPS properties. The executive order requires that short- and long-term adverse impacts associated with occupancy, modification or destruction of wetlands be avoided whenever possible. Indirect support of development and new construction in such areas should also be avoided wherever there is a practicable alternative.

The policies and procedures related to floodplain management include: preserving floodplain values; minimizing potentially hazardous conditions associated with flooding; and adhering to all federally mandated laws and regulations related to the management of activities in floodprone areas.

The purpose of this Statement of Findings (SOF) is to present the NPS rationale for its proposed plan to stabilize portions of Las Vegas Wash. This SOF also documents the anticipated effects on these resources.

HISTORY OF LAS VEGAS WASH AND DESCRIPTION OF PROJECT AREA

The proposed project would be located within Las Vegas Wash, at Lake Mead NRA, at the site and downstream of the Northshore Road Bridge. Las Vegas Wash is in the southeastern Las Vegas Valley and is approximately 19 kilometers (12 miles) long, from its headwaters northwest of the Las Vegas metropolitan area to its mouth at Las Vegas Bay, an arm of the western portion of Lake Mead. About 0.6 kilometer (0.4 mile) upstream of the bridge is Lake Las Vegas.

Las Vegas Valley has a total drainage area of about 5,700 square kilometers (2,200 square miles) and includes the metropolitan area of Las Vegas. Las Vegas Wash is the primary drainage channel for all stormwater, urban runoff, shallow groundwater, and treated wastewater discharges in the entire valley. The drainage area has extensive vertical relief. The maximum elevation is nearly 3,600 meters (11,811 feet) in the mountains west of Las Vegas, and the minimum elevation is about 366 meters (1,201 feet) where Las Vegas Wash enters Lake Mead.

The project area is near the intersection of Lakeshore Road and Northshore Road. The Northshore Road follows the north and west shores of Lake Mead, connecting the Las Vegas metropolitan area with the developed sites of Callville Bay, Echo Bay, and Overton Beach along this portion of the lake. Northshore Road crosses Las Vegas Wash on a 39-meter- (128-foot-) long, two-lane, three-span, reinforced concrete, box girder bridge. The bridge crossing is about 1.6 kilometers (1.0 mile) above the mouth of Las Vegas Wash at Las Vegas Bay. The Northshore Road and bridge are owned and maintained by the NPS.

History of Las Vegas Wash

The project area reach of Las Vegas Wash has been unstable since the 1960s. By 1969, floodplain erosion was visible at two sites in the wash (Glancy 1999). The upstream erosion site was at its confluence with the Three-Kids Wash tributary. The downstream erosion site was on the downstream side of Northshore Road and is the subject of this evaluation. The Northshore Road crossing consisted of a box culvert in 1969. Increasing runoff and flood flows in Las Vegas Wash were undermining and eroding the outlet of the box culvert to the degree that it was in danger of completely washing out, collapsing, and closing the road. Therefore, in 1978, the culvert was removed and replaced by the existing bridge (Ayres Associates 2001).

The summer of 1984 produced multiple flash floods in Las Vegas Wash. These floods caused roughly 7.6 meters (24.9 feet) of floodplain degradation in the vicinity of the Northshore Road Bridge. From 1960 through 1984, an estimated 3.4 million cubic meters (120.1 million cubic feet) of sediment were eroded from the wash and deposited in Lake Mead (Ayres Associates 2001).

Construction of the Lake Las Vegas dam began in 1989 and was completed in the early 1990s. Water from Lake Mead was pumped to fill the area behind the dam to create Lake Las Vegas. Water in Las Vegas Wash bypasses Lake Las Vegas because it is channeled underneath the lake through buried concrete pipes; however, Las Vegas Wash flood flows that exceed the capacity of the bypass conduit do enter Lake Las Vegas. When necessary, the flood flows are released to the downstream reach of Las Vegas Wash through a combination of spillways. As such, wash flows in the reach of the wash east of Lake Las Vegas are regulated by the dam upstream.

Large floods occurred in Las Vegas Wash in July and September of 1998 and again in July 1999. The 1999 flood is the flood of record, with an estimated peak discharge rate of 481.4 cubic meters per second (17,000 cubic feet per second) just upstream of Lake Las Vegas. Prior to that flood, the September 1998 flood had been the flood of record, with a peak discharge rate of about 270.7 cubic meters per second (9,560 cubic feet per second). A comparison of 1989 and 1999 reports and maps at the bridge site shows that the wash channel has lowered approximately 1.5 to 1.8 meters (4.9 to 5.9 feet) at the bridge during this 10-year period (Ayres Associates 2001).

In summary, since construction of the existing bridge, the ever-increasing amount of runoff in Las Vegas Wash has caused the wash channel to cut ever deeper into the landscape and the wash channel to grow wider.

Description of Project Area

The project area is located in an area underlain by bedrock of the Muddy Creek Formation and varying thicknesses of unconsolidated Quarternary age alluvium and colluvium. Las Vegas Wash has generally occupied the same position within the valley for millions of years, with cycles of degradation and aggradation. The most recent cycle of aggradation ended approximately 30 years ago as rapid urbanization within the watershed initiated a cycle of degradation. This transformed the ephemeral stream into a perennial stream, with mean daily flows increasing proportionately with increasing development. This has resulted in significant channel degradation and widening.

In the 1960s, the original ephemeral stream was small and occupied a wide shallow valley floor covered with dense riparian vegetation. Urbanization resulted in increased flows in the wash and has led to significant lowering and widening of the Wash. Las Vegas Wash presently occupies a deeply incised valley bound by vertical cliffs and steep hillslopes. High alluvial terraces are present intermittently along the margins of the Wash. The floodplain has been converted to a canyon.

Las Vegas Wash is composed of a stream riparian community. The primary vegetation is nonnative tamarisk (saltcedar) (*Tamarix ramosissima*). Although nonnative tamarisk is not a state or federally listed noxious weed, it is an aggressive species that creates thick monocultures, exhibits very little diversity in height or composition, and provides less-suitable habitat for wildlife than does native vegetation. Estimates of tamarisk in the entire Las Vegas Wash show that, since 1975, tamarisk has increased from approximately 20 percent of vegetation in the wash to approximately 80 percent of total vegetation (LVWPCT 2000). Other plant species found in the Las Vegas Wash portion of the project area include salt-tolerant herbs such as sedges (*Carex* spp.), rushes (*Juncus* spp.), cattail (*Typha domingensis*), and salt grass (*Distichlis spicata*) (NPS 1996).

The riparian vegetative community described above currently has a relatively low value to wildlife because of the lack of well-developed plant diversity and structure due to the presence of the invasive, nonnative tamarisk. However, riparian shrubs do provide some protective cover from nearby disturbances associated with recreation and Northshore Road, as well as nest sites for small birds. A variety of wildlife uses the wash, including the black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), round-tailed ground squirrel (*Spermophilus tereticaudus*), and a variety of songbirds and lizards. Amphibians that inhabit the wash include red-spotted toad *(Bufo punctatus)*, wood house toad *(Bufo woodhousei)*, northern leopard frog *(Rana pipiens)*, and bullfrog *(Rana catesbeiana*). Fish species that have been documented include carp *(Cyprinus carpio)*, fathead minnow *(Pimephales promelas)*, and red shiner *(Notropis lutrensis)* (LVWPCT 2000).

Las Vegas Wash flows year-round because it is the outflow for an average of 579 million liters (153 million gallons) per day of treated wastewater, urban runoff (the result of landscape overwatering and surface street runoff), shallow groundwater (water less than 9 meters [30 feet] below land surface that flows to the lowest part of the valley then seeps into the wash), and stormwater from the entire Las Vegas Valley (LVWCC 2001a, 2001b). Its total drainage area is approximately 5,700 square kilometers (2,200 square miles), and its average base flow due to wastewater discharge is about 6.8 cubic meters per second (240 cubic feet per second) (LVWPCT 2000).

The primary water quality issues of concern in Las Vegas Wash include sediment, selenium, perchlorate, nutrient loading, and urban chemicals. Sediment transport in the wash ranges from 50 to 1,600 tons per day, as measured by total suspended solids, and varies depending upon the time when samples are collected. Some sediment settles out of the water as it pass through a settling basin before entering the underground pipes under Lake Las Vegas (LVWPCT 2000). As such, sediment loads in the project area portion of the wash is typically lower than upstream of Lake Las Vegas.

Elevated selenium concentrations raise concerns regarding the potential for bioaccumulation in the food chain and may be related to adverse effects on some fish and wildlife species found in areas with elevated selenium concentrations. Elevated selenium concentrations occur near the entrance to the Clark County Wetlands Park (LVWPCT 2000).

Perchlorate was detected in Las Vegas Wash and Lake Mead in 1997. It was manufactured by two Las Vegas Valley companies between the 1950s and 1997. The source for perchlorate in Lake Mead is intercepted shallow groundwater in Las Vegas Wash. Perchlorate values near the project area were measured at 1,050 parts per billion in 1997 (LVWPCT 2000). The normal levels at the water intake facilities are between 11 and 14 parts per billion, while state and federal standards are set between 18 and 35 parts per billion.

Urban chemicals include any type of chemical used in homes or businesses, such as pesticides, solvents, herbicides, gas products, oil, and grease. Urban chemicals can reach Las Vegas Wash as intercepted shallow groundwater or as surface flow resulting from over-irrigation and storm events (LVWPCT 2000).

Other water quality concerns that have been documented in the Las Vegas Wash in the past five years include pesticides, heavy metals, human pathogens, and hydrocarbons. Studies conducted as a part of the US Geological Survey's Nationwide Assessment of Water Quality Program found fish at the confluence of the wash and Lake Mead to show high incidence of endocrine disruption. Due to water quality concerns, the Nevada Department of Environmental Protection initiated the interagency Lake Mead Water Quality Forum to coordinate monitoring, to identify issues, and to seek solutions to water quality problems. The forum will be developing long-term water discharge plans over the next five years, with the goal of improving the quality of water entering Lake Mead (NPS 2000).

Water is routinely sampled for quality, relative to state standards for wastewater discharge. Water quality also is being monitored by various groups, including the Las Vegas Valley Dischargers, Bureau of Reclamation (Reclamation), Southern Nevada Water Authority, and Las Vegas Valley Stormwater Quality Management Committee. Reclamation has continuously monitored water quality of the wash for 12 years. Its data show that the temperature of the wash remains relatively stable throughout the year but increases from 20 degrees Celsius (68 degrees Fahrenheit) to nearly 28 degrees Celsius (82 degrees Fahrenheit) by mid-summer (LVWPCT 2000).

Since August 2000, water quality also has been monitored monthly by the Las Vegas Wash Coordination Committee. There are eight sampling sites along the wash, one of which is near Northshore Road. Parameters that are measured include water temperature, dissolved oxygen concentration, pH, and electrical conductivity. Samples for heavy metals, cations-anions, perchlorate, nutrients, and bacteria are also collected but less frequently (LVWCC 2001c). Results of sampling near the project area were not available at the time of publication (Las Vegas Water Quality 2001).

FLOODPLAINS AND WETLANDS WITHIN THE PROJECT AREA

Floodplain

A floodplain is typically a strip of relatively flat and normally dry land alongside a stream, river, or lake that is covered by water during a flood. In the case of Las Vegas Wash, the floodplain has the form of a canyon. The Northshore Road Bridge piers are within the floodplain and the abutments are outside the floodplain. The tops of the canyon walls just upstream of the bridge are indicative of the floodplain elevation before substantial degradation occurred. Downstream of the bridge, the floodplain is characterized by a high terrace on one bank and an inset floodplain on the other bank. There is also an inset floodplain upstream of the bridge. Sediments that make up the inset floodplain are unconsolidated sand and gravel, which are highly susceptible to erosion (Ayres Associates 2001).

Wetlands

Multiple wetlands alongside the 19-kilometer- (12-mile-) long Las Vegas Wash are a mechanism for improving water quality as urban flows enter the wash en route to Lake Mead and the Colorado River system. Some of these wetlands are discussed in Section 1.6, Relationship to Other Planning Projects. Since the mid-1970s, wetlands associated with the wash have decreased from 809 hectares (2,000 acres) to less than 121 hectares (300 acres) because of deepening of the wash channel, which drained some adjacent wetlands (LVWCC 2001d; LVWPCT 2000). Wetlands within Las Vegas Wash in the NRA have been impacted by the continued degradation and deepening of the wash channel. The only wetlands in the project area are fringe wetlands, occurring alongside the wash channel. Under the Cowardin classification system (Cowardin et al. 1979), these wetlands are considered a combination of palustrine emergent and scrub-shrub wetlands. Where there is high moisture, there are patches of cattail and common reed (*Phragmites*), mixed with nonnative tamarisk and wetland annual plants. In the drier areas the primary vegetation is saltbush (*Atriplex* spp.) and arrow weed (*Pluchea sericea*).

PROPOSED PROJECT IN RELATION TO WETLANDS

Las Vegas Wash Stabilization

The proposed project includes installing three grade-control structures at intervals downstream of the Northshore Road Bridge to stabilize the wash channel at or near its present level and width (Figure 2-1 of the EA). The grade-control structures would be constructed of roller-compacted concrete (RCC). RCC would be composed of material excavated on-site, so it would visually blend in with the wash and vicinity. No modifications to the bridge, its abutments, or its piers would be made.

The upstream-most structure would be immediately downstream of the bridge and would be approximately 1.2 to 1.5 meters (4.0 to 5.0 feet) higher than the existing bed of the wash. The second structure would be approximately 200 meters (656 feet) downstream from the first, and the third structure would be roughly 260 meters (853 feet) downstream of the second. All measurements between structures are along the channel thalweg, which is the line connecting the lowest or deepest points along the streambed. Each of the three structures would provide a vertical 2.5-meter (8.2-foot) drop (Ayres Associates 2001). Estimated fill requirements for all the structures are shown in Table B-1.

Table B-1
Estimated Excavation Requirements for Alternative B

ELEMENT	RCC IN CUBIC METERS (CUBIC YARDS)	RIPRAP IN CUBIC METERS (CUBIC YARDS)	EXCAVATION IN CUBIC METERS (CUBIC YARDS)
Grade-control Structure 1 (upstream-most structure)	165 (5,834)	6 (229)	27,700 (978,210)
Grade-control Structure 2 (middle structure)	104 (3,675)	3 (90)	14,700 (519,123)
Grade-control Structure 3 (downstream-most structure)	143 (5,062)	10 (361)	28,800 (1,017,057)
Toe protection	186 (6,575)	0	20,700 (731,010)
Tributary stabilization	20 (722)	47 (1,667)	1,000 (35,314)
Total	**618 (21,868)**	**66 (2,347)**	**92,900 (3,280,715)**

Source: Ayres Associates 2001.

Because the upstream face of each RCC structure would be somewhat higher than the existing streambed, the upstream face would act as a temporary impoundment to water flowing downstream. This would slow the velocity of water flowing downstream, which in turn would reduce erosion and associated channel widening and deepening. The streambed immediately upstream of the upstream face would fill in with sediment over approximately one to two years. They would not be filled in mechanically following construction, but instead would be allowed to fill in naturally over time.

The second and third grade-control structures would have an RCC stilling basin on the downstream side to protect the structure from failure resulting from local scour at the downstream face. The first grade-control structure would be constructed either with or without a stilling basin on the downstream side, a determination that would be made during final design. The floor of each stilling basin would be 1.0 meter (3.3 feet) below the top of the downstream edge of the basin, which would be set at the future channel grade. Downstream of each stilling basin a short riprap apron would be installed to protect the structures from scouring and undercutting (Ayres Associates 2001). Figure 2-2 in the EA depicts a profile of the upstream-most grade-control structure shown with the optional stilling basin. The profiles of the second and third grade-control structures would be similar to Figure 2-2, with the exception of elevations and exact dimensions of the structures.

Without the installation of grade-control structures, the ultimate depth of long-term degradation in the wash is estimated to reach between 15 and 20 vertical meters (49 and 66 vertical feet). The three grade-control structures proposed under Alternative B would accommodate 7.5 meters (24.6 feet) of degradation (Ayres Associates 2001). As such, the three grade-control structures would not be a permanent solution to erosion problems in the wash. Additional stabilization measures would likely be necessary in 20 to 30 years to protect the three original grade-control structures from undermining and failure.

Canyon Wall Stabilization (Toe Protection)

The north and south canyon walls of Las Vegas Wash just upstream of the bridge are eroding and would be stabilized under the proposed project. Such stabilization, termed "toe protection," would include placing RCC riprap in a stepped pattern, horizontally into the wash and slightly vertically up the side of the canyon wall. The RCC riprap would be constructed of durable local aggregate materials to protect the bank of the wash from further erosion. Horizontally the RCC riprap would be placed on the inside of the anticipated 100-year flood inundation limits, which were derived from hydrologic modeling of the wash. Vertically the top of the RCC riprap would be set slightly above the 100-year flood elevation. The vertical bottom of the riprap would be low enough to accommodate a shift in the low-flow channel and to allow for local scour, which is currently estimated at a minimum of 2.0 meters (6.6 feet) below the current low-flow thalweg. However, deeper embedment in the streambed could be required to protect the riprap from local scour, a determination that would be made during final design. Toe protection would keep the north pier out of the 100-year floodplain and therefore would protect that pier from local scour during the 100-year flood and smaller floods. Based on local conditions, toe protection design could require modification during final design (Ayres Associates 2001).

In summary, the RCC riprap used for toe protection generally would not be visible because it would be mostly underwater. The overall purpose of toe protection would be to protect the stream banks and canyon walls from further erosion and undercutting just upstream of the Northshore Road Bridge.

Tributary Stabilization

The tributary that enters Las Vegas Wash on the south bank just downstream of the bridge also would require stabilization to keep it from threatening the south abutment fill. The downstream end of the chute would tie into the toe protection described above for the south canyon wall immediately upstream of the bridge. The design of the tributary stabilization also would require RCC riprap on the bed of the wash to prevent local scour from the tributary. This riprap would be extended upstream under the bridge to protect the south pier and the toe protection from undermining due to local scour (Ayres Associates 2001).

PROPOSED PROJECT'S IMPACT ON WETLANDS AND FLOODPLAINS

Long-term impacts to in-stream vegetation would occur where actual structures and toe protection would be located. The total area required for installing structures under Alternative B is approximately 0.7 hectare (1.7 acres). Since approximately one-third of this area is estimated to contain vegetation, approximately 0.2 hectare (0.4 acre) of vegetation would be permanently removed. Primarily tamarisk, cattail, and salt grass would be affected.

Special Aquatic Sites (Wetlands)

The proposed project would require the removal of riparian vegetation for wash access and in-stream construction. The primary vegetation to be affected is nonnative tamarisk.

The total in-stream area that could be affected by construction equipment is approximately 6 hectares (15 acres). Approximately 2 hectares (5 acres) of this contains vegetation, primarily tamarisk, that would be removed during construction. Besides tamarisk, the area contains cattail and salt grass, which also would be removed from the construction site. Overall, approximately 0.2 hectare (0.4 acre) of fringe wetlands would be filled by the construction of the structures, with 0.2 hectare (0.4 acre) of in-stream vegetation permanently removed from the site of the structures. Once construction is completed, native vegetation such as willow (*Salix exigua* and *Salix gooddingii*), cottonwood (*Populus fremontii*), and other native riparian vegetation would be replanted around the site and adjacent to the newly created pools. The areas around the structures would be restored, and approximately 4 hectares (10 acres) of wetlands would be created. The area would be monitored and maintained to prevent the reestablishment of nonnative tamarisk.

Flood Control Functions

The grade-control structures would be within the 100-year floodplain and, as wash stabilization measures, would likely result in the preservation of the natural and beneficial values served by the floodplain.

PROPOSED MITIGATION

Federal and NPS policy is to avoid siting projects in wetlands whenever possible. If circumstances make it impracticable to avoid wetlands, then mitigation of unavoidable impacts must be planned. A NPS wetlands “no-net-loss” policy requires that wetland losses be compensated for by restoration of wetlands, preferably of comparable wetland type and function and in the same watershed (if possible).

Overall, approximately 0.2 hectare (0.4 acre) of fringe wetlands would be permanently affected by the construction of the structures, with 0.2 hectare (0.4 acre) of in-stream vegetation permanently removed from the site of the structures. This SOF commits to full 1:1 compensation for the disturbed acreage.

Best Management Practices

Best management practices (BMPs) are means of preventing or reducing nonpoint source pollution in the Las Vegas Wash watershed and of minimizing soil loss and sedimentation. BMPs will minimized impacts to Las Vegas Wash and will include all or some of the following features, depending on site-specific requirements:

- Locating waste and excess excavation outside the riparian area to avoid sedimentation;
- Prior to construction, installing silt fences, straw bale barriers, temporary earthen berms, temporary water bars, sediment traps, stone check dams, brush barriers, or other equivalent measures, including installing erosion-control measures around the perimeter of stockpiled fill material;
- During construction in Las Vegas Wash, diverting wash base flows around each excavation area to create drier construction work areas that are contained

from the watercourse. This will minimize construction-related sediment delivery to the watercourse. Each excavation area will be dewatered as necessary, and erosion-control measures will be installed at the outflow of the dewatering device to minimize sediment delivery to the water course;

- Conducting routine water-quality monitoring of Las Vegas Wash during construction to assess effectiveness of erosion-control measures;
- Conducting regular site inspections throughout the construction period to ensure that erosion-control measures were properly installed and functioning effectively;
- Properly storing, using, and disposing of chemicals, fuels, and other toxic materials; and
- Refueling construction equipment in upland areas only, to prevent fuel spillage near water resources.

Vegetation

Undesirable species, such as tamarisk, will be aggressively controlled in high-priority areas. Other undesirable species will be monitored, and control strategies will be initiated if these species occur.

Riparian vegetation will be avoided, as feasible. To prevent the introduction of and to minimize the spread of exotic vegetation and noxious weeds, the following measures will be implemented:

- Minimize soil disturbance;
- Pressure-wash all construction equipment before it is brought into the NRA;
- Limit vehicle parking to existing roads, parking lots, or the access route;
- Obtain all fill, rock, or additional topsoil from the project area;
- Revegetate all disturbed areas immediately following construction activities with adapted native seed or plants that are found in adjacent areas and that are certified as weed free; and
- Monitor all disturbed areas for two to three years following construction to identify noxious weeds or exotic vegetation. Remedial and control measures will be implemented as needed and could include mechanical, biological, chemical, or additional revegetation treatments, in accordance with NPS-13, Integrated Pest Management Guidelines.

To maximize restoration efforts after completion of construction activities, the following measures will be implemented:

- Salvage topsoil from access route construction for reuse during restoration on disturbed areas to ensure proper revegetation;

- Salvage native vegetation for subsequent replanting in the disturbed area; and

- Monitor revegetation success for three years following construction; implement remedial and control measures as needed.

Herbicide application to control vegetation will be restricted to chemicals that do not pollute or persist in wetland, riparian, and aquatic areas. Potential drift and runoff from chemical application will be considered, as will appropriate methods and timing of application.

On-Site Rehabilitation of Wetlands

The Las Vegas Wash Wetland Enhancement Project will be adopted. The goals and objectives of this project are to actively introduce desired native wetland and riparian plants that are capable of sustaining a viable wetland community that promotes a high degree of plant diversity and associated wildlife habitat.

The desirable plant species to be planted on approximately 4 hectares (10 acres) include emergent species such as spikerush (*Eleocharis* spp.), bulrush (*Scripus* spp.), sedges, rushes, and riparian plants such as cottonwood, willow, and mesquite (*Prosopis pubescens* and *Prosopis glandulosa*).

Only native plants will be used. Emergent species may be collected from harvesting local sources including Lake Mead, Lake Mohave, and various springs and surrounding areas. Plant material may be propagated at the nurseries for Lake Mead and the Nevada Department of Conservation and Natural Resources, Division of Forestry. Emergent plants may be directly transplanted into the project area immediately following harvest or may be held and further propagated at the Lake Mead nursery.

Planting techniques include rhizomes or tubers, seedlings, rooted containers, root/rhizome/plant clumps, and seeds. Plant collection will occur in the late fall or winter. Transplanting will occur preferably in the winter during plant dormancy. Labor will be performed by Lake Mead staff, seasonal work crews, and volunteers.

Specific transplant locations will be determined after the water levels at the structures have reached a consistent and desirable elevation. Emergent species will be planted in water less than 0.6-meter (2 feet) deep, and riparian species will be planted along the shoreline within or near the zone of soil saturation. Densities will vary depending on the species and allowable transplant habitat. In general, transplanting will occur in light densities since most plant species used reproduce by rhizomes and root suckering and are capable of rapid colonizations.

Photo-point monitoring has been established in the wash. Photo points will document revegetation efforts, and the transplanted plants will be monitored for survival rates. A water level monitoring system will be established to document surface elevations.

Off-Site Compensation for Wetlands

No off-site compensation or off-site wetland restoration would be conducted.

OTHER ALTERNATIVES CONSIDERED

No Action

Inclusion of a No Action Alternative is required by the Council on Environmental Quality regulations and sets a baseline against which to compare impacts of action alternatives. Under the No Action Alternative, existing conditions and management actions at Las Vegas Wash in the vicinity of Northshore Road Bridge would continue into the future. No long-term stabilization measures would be implemented, and the Las Vegas Wash at the Northshore Road Bridge would continue to degrade. Specifically, the trend of the canyon floor degrading and widening would continue unchecked.

Other Project Designs

Construct Grade-Control Structures Using Sheet Pile. The option of constructing grade-control structures with sheet pile instead of RCC was explored. This option was dismissed because the characteristics of the bedrock within the wash would make it infeasible. Plus, there are few local contractors with the extensive experience in sheet pile construction necessary to complete the project successfully (Ayres Associates 2001).

Construct Rock Berms. This option would include constructing rock berms in the wash using larger rocks than were used in the 1996 stabilization attempt. It was hypothesized that the reason the first attempt (in 1996) to construct rock berms within the wash failed was due to the inadequate rock size. If larger rocks were to be used, the structures could prove successful. There were several reasons to dismiss this alternative. Even with the use of larger rocks, the increasing flows in the wash could cause the rock structures to wash out, and there is no guarantee that the project would be successful. Also, no large rocks are available on site. The cost of acquiring the size of rocks necessary would be substantial. Adequate funding would not be available for a period of years, during which time the existing bridge could fail.

Construct Riprap in Channel. This alternative was initially discussed in the first stabilization analysis in 1996. This option would include placing riprap in the channel from the Lake Las Vegas dam to below the Northshore Bridge, which would protect the channel in this area. This alternative was dismissed because riprap would destroy the habitat and vegetation in the wash, it would not allow the construction of wetlands and riparian habitat, and it would lead to increased erosion downstream of where the riprap terminates.

Use Riprap on Bridge Piers. This alternative would include constructing riprap on the base of each bridge pier in the wash. It was dismissed since it would not solve the overall purpose and need of the project, which includes protecting the piers and abutments and reducing erosion in the wash.

Close Segment of Northshore Road and Demolish Bridge. This alternative would include closing a segment of the Northshore Road and demolishing the bridge. Traffic could be diverted through North Las Vegas via Lake Mead Boulevard (Figure 1-2 of the EA). This alternative was dismissed because of its inconvenience to Lake Mead NRA users because it would require users in the Las Vegas Bay and Boulder Beach areas needing a north-south connection to exit the NRA, drive to another north-south connection in eastern Las Vegas, then reenter the NRA, a detour of over 30 miles. This alternative also was dismissed because the Northshore Road Bridge is structurally in good condition and should be salvaged if possible.

Replace Bridge. This alternative would replace the bridge with a new structure capable of accommodating a dramatic lowering of the canyon floor and retreating of both canyon walls without threatening the bridge and its users. Such a new bridge would be constructed alongside the existing bridge, and short segments of new connecting road would be constructed to connect to the existing Northshore Road. The existing bridge would be demolished before it was undermined and collapsed because an accidental collapse could harm the new bridge or any people in the area. Accomplishing the work on the existing bridge would require temporary traffic delays and closures during the one- to two-year construction period. This alternative was dismissed because the funding required to construct a new bridge would not be fully available for approximately eight to ten years, and the existing bridge would very likely be undermined and would collapse in the meantime.

Modify Bridge. This concept would involve constructing new footings for the existing abutments and adding a new span at each end to create a considerably longer bridge. The wash would continue to cut a deeper and wider channel without threatening the bridge and its users. Modifying the existing bridge could conceivably be accomplished by constructing deep-drilled shafts adjacent to the existing abutments and tying the deck and abutments to the new drilled shafts. The shafts would have to be deep and strong enough to tolerate a long unsupported length when the canyon wall retreated beyond its present location. The existing abutment location then would become an intermediate bent, and a new abutment would be constructed well back from the canyon wall. Because continued degradation of the wash also would threaten the piers, it would likely be necessary to retrofit them with drilled shafts as well (Ayres Associates 2001). Work on the existing bridge would require temporary traffic delays and closures during the one- to two-year construction period. This alternative was dismissed because the funding required to modify the existing bridge would not be fully available for approximately eight to ten years, and the existing bridge would very likely be undermined and would collapse in the meantime.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES ASSOCIATED WITH THE PROPOSED PROJECT

The potential environmental consequences of the proposed action and alternatives are described more fully in the EA.

Impacts to Fish, Wildlife, and Other Aquatic Organisms and Their Habitat

The project area currently provides low value for fish and other aquatic organisms. Amphibians that currently inhabit the wash include red-spotted toad, wood house toad, northern leopard frog, and bullfrog. Fish species that have been found in the wash include carp, fathead minnow, and red shiner. There would be minor short-term impacts to fish and other aquatic organisms from the increase in in-stream sediment and turbidity levels during the construction of the project. This impact would occur only during the construction period and should only pose a limited threat to the aquatic habitat as the area is currently exposed to periodic turbidity and sediment loading. Overall, the completion of the project would improve water quality, which should in turn benefit aquatic life.

Las Vegas Wash provides low quality habitat to wildlife, primarily due to the presence of thick stands of nonnative tamarisk. Still, the area supports a variety of bird species, such as waterfowl, herons, and songbirds. Lizards, small mammals, and coyotes also utilize the area. The project area's relative value to wildlife would increase with the proposed project since tamarisk would be removed and replaced with native riparian vegetation through plantings, the riparian area would be stabilized, and wetlands would be restored.

Construction activities could temporarily displace wildlife to adjacent habitats. This would be a temporary impact occurring only during the construction periods.

Impacts to Threatened and Endangered or Sensitive Species

The project area is not considered critical habitat, and considered only potential habitat for one listed species, the endangered Southwestern willow flycatcher. Suitable habitat is located nearby for the threatened desert tortoise, endangered Yuma clapper rail, and the endangered razorback sucker.

Habitat would be improved as detailed in the above wildlife section.

The Southwestern willow flycatcher has been rarely observed in Las Vegas Wash, though not within or in the vicinity of the project area. No nests have been documented in the wash. Since the flycatchers are neotropical migrants that arrive in the region in late April and migrate out of the region in July and August, these species would not be impacted by a project that would occur during the fall months. The species could actually benefit from the project in the long-term as the restoration efforts take effect and the native vegetation becomes established in the wash.

Yuma clapper rails habitat consists primarily of marshes with dense cattail and bulrush. It has been documented in the wash, but not in the project area. No marsh habitat exists in the project area so the occurrence of Yuma clapper rail is unlikely. The species could pass through the project area at it travels between its habitat, but it would not likely be adversely impacted by any aspect of the project since it could move away from any construction activity and nesting does not occur at the project site. It could benefit from the establishment of a native riparian community, as stated above.

Razorback suckers are known to occur downstream from Las Vegas Wash, at Blackbird Point within Lake Mead. This project would have no direct impact to this species. Current flows of sediment and turbidity levels from the wash tend to drop out of the water column prior to reaching Blackbird Point. However, if water quality improves in the wash, it could improve in Las Vegas Bay, which could lead to improved habitat for this and other fish species.

The desert tortoise does not exist in the project area, and would not be affected by any aspect of this project. The desert tortoise does exist within 1.6 kilometers (1.0 mile) of the project area, so surveys were conducted in accordance with USFWS protocol in the access wash (Figure 2-3 of the EA). No presence of tortoise or tortoise sign were found. Las Vegas Wash is unsuitable habitat for the desert tortoise.

Impacts to Cultural Resources

No cultural resources would be impacted by the proposed project.

Impacts to Visitor Use and Park Operations

Visitors would be prohibited from utilizing a portion of the wetlands trail and the Las Vegas Wash area temporarily, for approximately four months during construction activities. Visitors would benefit from the proposed project as the Northshore Bridge would be stabilized and the scenic views in the wash would improve with the reestablishment of native vegetation and a wetlands area. Park operations would improve with the stabilization of the bridge as it would allow the bridge to remain open, even during flood events.

Impacts to Socioeconomic Environment

Any bridge closures could result in decreased visitation to portions of the recreation area, therefore, protection of the bridge would result in a benefit to these facilities as visitors would continue to have adequate access from the east side of the Las Vegas Valley to these facilities.

PERMIT REQUIREMENTS

- US Army Corps of Engineers—Nationwide or Individual Permit, pursuant to Section 404 of the Clean Water Act, for minor discharges of dredged or fill material in waters of the US.

- Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Quality Planning—Water Quality Certification, pursuant to Section 401 of the Clean Water Act.

- Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Pollution Control—General Rolling Stock Permit for operating equipment in a body of water.

- Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Pollution Control—General Construction Stormwater Permit for authorization to discharge stormwater associated with construction activity, under the National Pollutant Discharge Elimination System.

CONCLUSION

As required by NPS wetland protection procedures, impacts to 0.2 hectare (0.4 acre) of fringe wetlands will be compensated for, on a minimum 1-for-1 acreage basis, by restoring 4 hectares (10 acres) of wetland habitat and associated riparian habitat in the project area. The NPS therefore finds the proposal to be consistent with Executive Order 11990 and the NPS no-net-loss wetlands policy.

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